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ABSTRACT

This bulletin is a bimonthly publication which reports the current national and international literature in the area of science and public policy. It is intended for individuals and organizations engaged in studying, formulating, or implementing public policy relating to science and its applications. The literature reported includes books, reports and periodical articles. The focus of the literature reported is on matters of broad public policy; literature of a highly technical and narrowly specialized nature is not included. The information presented consists principally of precis that briefly summarize the content of the cited literature. The precis are presented under one of a number of topical categories including (1) General, (2) Science, Domestic Problems and National Goals, (3) Needs and Allocation of Resources for Science, (4) National R & D Programs, (5) Science, Education, and the University, (6) Science, Management, and Policy-Making Bodies, (7) Science, Foreign Affairs and National Defense, and (8) Interactional Science Policy. (LC)

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Science Policy Bulletin

Volume 3 • Number 2 • April 1970

The Bulletin reports the current national and international literature in the area of science and public policy, encompassing both "policy for science" and "science for policy" matters. For brevity, "science" is used to denote engineering, technology, and science.

The Bulletin is intended for individuals and organizations engaged in studying, formulating, or implementing public policy relating to science and its applications. The purpose of the Bulletin is to alert and inform those engaged in such activities of new additions to the science policy literature.

The literature reported by the Bulletin includes books, reports, periodical articles (see back cover for a listing of the regularly screened periodicals), as well as fugitive material. The focus of the literature reported is on matters of broad public policy; literature of a highly technical and narrowly specialized nature is not included.

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Volume 3 • Number 2 • April 1970

Editor, Robert W. Brainard

The Bulletin is a bimonthly, controlled circulation, publication of Battelle Memorial Institute. The contribution of information to the Bulletin as well as suggestions and comments on its content and coverage are welcomed. Please address all correspondence to: The Managing Editor, Science Policy Bulletin, Battelle Memorial Institute 505 King Avenue, Columbus, Ohio 43201.

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1013. Dedijer, S., "The R&D Depression in the United States", *Science*, v. 168, no. 3929, 17 April 1970, pp. 344-345. Possible causes and impacts of the "current R&D depression" in the U.S. are discussed by a "science-policy-minded visitor from Europe". The author suggests that the R&D depression is "closely connected with the current process in the United States of reexamining social values and national goals and objectives". He believes that the demand for a more rational and socially relevant science policy "has been growing in the United States over the years". Now, the "Marxist syndrome – that R&D must be directly relevant to social problems . . . – is becoming the U.S. science policy rule of thumb". As for impacts beyond the U.S., Dedijer suggests that if the depression continues "it will no doubt affect the whole of the world production of knowledge, inventions, and discoveries". Optimists "see in the current . . . depression a stimulus to . . . international cooperation in joint R&D projects" and the "development of a world R&D policy"; pessimists see it as "a first sign of the end of the U.S. age of science".

1014. "Is There a Future for Science in the United States?", *Nature*, v. 226, no. 5243, 25 April 1970, pp. 297-299. The problems and structural weaknesses of U.S. science are discussed and some remedies are proposed. At issue is whether the U.S. "shall remain the pacemaker of scientific discovery". To be so will require some changes in policy and structure. With special emphasis on university research, it is suggested that NSF be strengthened and broadened to handle the bulk of such research support and that it be empowered to deal with policy matters. It "is now time to abandon the plurality of agencies" that support basic research and concentrate this function in NSF, as well as policy responsibilities now assigned to the Office of Science and Technology (which "seems increasingly irrelevant"). It is also suggested that the scale of support for university research be determined by "decisions about the scale and quality of higher education" and by "the development of science as such", and that the allocation of money to different areas of research be set on scientific and not administrative grounds.

1015. Perl, M. L., "The 'New Critics' in American Science", *New Scientist*, v. 46, no. 696, 9 April 1970, pp. 63-65. The "New Critics" in American science are described as students, teachers, and researchers who are undertaking "a new and critical examination of the political relationships between the scientific community, the universities, and the national government". "[They] see the United States and the world as facing two desperate technological problems – destruction of the natural environment by technological progress,

and the threats to world peace and human survival produced by the existing levels of nuclear armaments and weapons." To change the technological directions of the nation, the New Critics are using the approaches of "grass-roots political activities, dramatic public education on technical issues, and direct political action". They regard the scientific advisory system as "not working sufficiently well in practice", and question "the wisdom of having a Scientific Establishment with the triple roles of scientific advisor, lobbyist for federal funds for science, and overseer of how those funds should be distributed".

1016. Seaborg, G. T., "The New Optimism", *The Futurist,* v. 3, no. 6, December 1969, pp. 157-160. Describing himself as a "new optimist" in the face of increasing criticism of science and technology, the author stresses that "[T]echnology can be directed creatively to bring human society into close harmony with its natural environment". He discusses "three negative forces ... despair, distrust of technology and anti-intellectualism" that must be counteracted by "reemphasizing the potential of man, the contributions and potential benefits of science and technology and the supreme importance of knowledge and intellectual development allied with human sensitivity". "I think what most critics overlook in evaluating science and technology is society's – the public's – own past role in the problems created." He calls for increased "technological assessment", planning, and the setting of goals and priorities as means for dealing with current problems. After discussing some types of technology applicable to these problems, he suggests that citizens, along with engineers and scientists, must share the responsibility for "the ultimate effects of ... innovation". **1017.**

1017. *Report of the Twelfth Annual Meeting of the National Research Council,* National Academy of Sciences, National Academy of Engineering, National Research Council, Washington, D. C., 1969, 178 pp. The proceedings of this annual meeting held in March, 1969, includes an address by Philip Handler (then President-Elect of the National Academy of Sciences) that deals with various science policy issues along with the proceedings of several plenary sessions. The topics and issues discussed by Handler include the state of American science, the application of science to societal problems, federal support of science, graduate education, and the question of the creation of a Department of Science. Several of the plenary sessions dealt with science policy topics: "The Role of Industry in National Science Policy", "Progress in Nonmilitary Applications of Nuclear Energy: Agriculture, Industry, and Water Supply", "Commission on Marine Science, Engineering, and Resources", "Environmental Studies Board", and "The Work of the Committee on Scientific and Technical Communication". (The

report is available from the Office of Information, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.)

1018. Lyons, G. M., *The Uneasy Partnership: Social Science and the Federal Government in the Twentieth Century*, Russell Sage Foundation, New York, N.Y., 1969, 394 pp. ($8.50). The growth in the application and support of the social sciences by the Federal Government are reviewed and the associated problems and policy issues are discussed in this book. The first chapter discusses the general role of social science knowledge in government, the impact of such knowledge on politics, and the factors underlying the increasing role of the social sciences. The next three chapters trace this growth from the early 1900's through World War II. Separate chapters are devoted to social science activities in the areas of national defense, foreign affairs, and economic and social programs. A final chapter examines the federal policy for the social sciences, including federal support and organizational proposals and issues. Completing the book are four appendices that reproduce portions of key reports on the role of the social sciences in the Federal Government.

1019. Schaffter, D., *The National Science Foundation*, F. A. Praeger (Praeger Library of U.S. Government Departments and Agencies), 1969, 278 pp. ($6.75). This book is a descriptive overview of the National Science Foundation. It presents information on the education and research support activities of the Foundation, its administrative organization and practices, and its relationships with other federal agencies, Congress, and nongovernment institutions. The 14 chapters of the book include: Origins, Historic and Legislative; The Foundation's Finances; The Promotion of Basic Research; Science Education Activities; Institutional Support for Science; Science Information Activities; International Science Activities; Science Policy Planning; NSF Relationships with Other Executive Branch Agencies; The Foundation and Congress; The Foundation and Its Special Publics; and The NSF, Present and Future.

1020. *Are Engineering and Science Relevant to Moral Issues in a Technological Society?*, A report from the Engineering Manpower Commission of the Engineers Joint Council, October 1969, 30 pp. The report consists of four papers addressed to the question of "the moral relevance of engineering and science from widely different backgrounds and viewpoints". The first, by R. B. Helfgott, deals with technology, social science, and moral choice; the second, by G. M. Newcombe, is a student's view of the social responsibilities of engineering as a profession; the third examines some of the moral issues in a modern technological society; and the fourth discusses ways in which engineering should change to better cope with social problems.

(The report can be obtained from the Engineers Joint Council, 345 East 47th St., New York, N.Y. 10017. Price: $1.00.)

1021. **Malik, S., *Index to Literature on Science of Science* (Special Issue on Management of Science and Technology), Research Survey and Planning Organization, CSIR, v. 5, no. 9, September 1969, 25 pp.** This special issue of the Index covers recent Indian, American, and British literature on the topic of Management of Science and Technology as published in 59 journals during the period 1964 - 1968. The unannotated bibliography of 320 items is divided into the following categories: Management as a Science, Management as a Profession, Management and Decision Making, Management and Planning, Management and Organization, Management and Industry, Management and Education, Management and Computers, Management and Research and Development, Management of Personnel, and Management and Human Relations. A listing of some 50 books dealing with the topic is also included. (The Index may be obtained from the Research Survey and Planning Organization, CSIR, Rafi Marg, New Delhi-1.)

1022. ***Index to Literature on Science of Science,* Research Survey and Planning Organization, CSIR, v. 5, no. 10, October 1969, 31 pp.** This bibliography on the "science of science" covers the recent (1969) literature on the topic as published in 24 journals, most of which are American and British. The briefly annotated bibliography of 164 items is divided into the following categories: General, Science and Agriculture, Science and Computer, Science and Education, Science and Manpower, Science and Planning, Science and Policy, Science and Foreign Collaboration, Science and Organization, Science and Politics, Science and Society, Science and Industry, and Science and Management. (The Index may be obtained from the Research Survey and Planning Organization, CSIR, Rafi Marg, New Delhi-1.)

2000 SCIENCE, DOMESTIC PROBLEMS AND NATIONAL GOALS

2017. Orlans, H., *Making Social Research More Useful to Government*, Reprint 155, The Brookings Institution, 1969, 8 pp. This paper summarizes and discusses "some things that are, and are not, likely to improve the usefulness of federally-financed social science research conducted outside the federal establishment to domestic programs of the American government". After arguing that social research "is indispensable to rational action by both public and private agencies", the author cites several weaknesses of such research: irrelevance to government needs; small scale, fragmented, inconsequential, nonadditive; poor quality; and avoidance of politically sensitive matters. Corrections called for include clearer research objectives, broader syntheses of knowledge, involvement of the "best scholars" in practical research, more "independent, empirical evaluation of the effectiveness of agency programs", direction of research to more significant problems, and greater utilization of the research findings. Each of these points is discussed in some detail. (The paper can be obtained from The Brookings Institution, 1775 Massachusetts Ave., N.W., Washington, D.C. 20036.)

2018. "White House Considers New Energy Study", *Washington Science Trends*, v. 23, no. 24, 23 March 1970, p. 1. "The White House Office of Science and Technology said this past week that a new national study may be made of future energy supply and demand because of the shortcomings in many previous forecasts. The Office, through its energy policy staff, cited the need to understand and predict future demand and supply of oil, gas, electricity, nuclear power and other energy sources. There have been many such studies in the past, but a Government-sponsored review of these efforts point to many shortcomings and unanswered questions. In addition, none of these studies reflect the recent concern with environmental problems. The energy policy staff said that most of the previous forecasts indicate that energy consumption in the 32-year period from 1968 to 2000 will be almost three times the consumption in the prior 32 years." (For further details, a "Review and Comparison of Selected U.S. Energy Forecasts", with data compiled by Pacific Northwest Laboratories, Battelle Memorial Institute, is available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Price: $1.00.)

2019. Seaborg, G. T., "Energy and Environment – A Rational Outlook", *Congressional Record*, v. 116, no. 63, 21 April 1970, pp. E3458-E3460. The Chairman of the U.S. Atomic Energy Commission discusses national energy needs in relationship to environmental

pollution. He reviews and analyzes "the anti-energy feeling being engendered today" and points to the crucial relationship of energy and economics. He stresses that "the protesting groups who delay power plant construction and expose the public that needs that power to potential problems which range from minor inconveniences to extreme dangers are often foisting their own value judgments on a larger segment of their fellow citizens". He questions, too, whether these groups weigh all the consequences in their objections to such plants. But partly because of these environmental concerns, Seaborg sees a "vast restructuring in our approach to using energy and resources" based on "wide systemization, great efficiency, recycle and a balancing of economic and environmental relations". Within this, he believes that nuclear power (which "is by far the safest and most environmentally advantageous method of generating electricity") will "play a significant role in giving us more power with less environmental pollution".

2020. "Hickel Proposes Environmental Task Force", *Washington Science Trends*, v. 23, no. 21, 2 March 1970, p. 129. "Interior Secretary Hickel has proposed creation of an environmental task force backed by Federal funding and staffed by young leaders in a Peace Corps-type operation. The Interior Secretary also suggested that the nation's universities set the pace in environmental programs, making ecology one of their prime tasks." "He suggested . . . that his task force might be termed the Environmental Control Organization and could be charged with such responsibilities as the inventory of publicly-owned lands." "He said task forces 'could move into these areas, make thorough studies of the peculiar characteristics of a mountain range, a prairie or a stretch of beach' – documenting the needs of the population and make recommendations as to 'their highest use'. Speaking of environmental concern, Hickel said: 'we have an uprising on our hands in this country'."

2021. "Packaging Pollution Control Act of 1970", *Science*, v. 168, no. 3928, 10 April 1970, p. 232. "Senator Gaylord Nelson . . . has introduced a bill that would levy a 'solid waste fee' on industries for product packaging according to several criteria including the possible toxic and health effects of disposal of the package and the ease with which the package could be 'recycled'. The Packaging Pollution Control Act of 1970 (S. 3665) directs the HEW Secretary and the Secretary of the Treasury to make a schedule of national packaging charges that reflects the effect of each type of packaging upon the environment. The bill proposes that the national packaging charges be routed to state and local governments for the construction and expansion of solid waste facilities."

2022. Lepkowski, W., "NBS Broadens Horizons to Consider Consumer", *Product Engineering*, v. 41, no. 3, 2 February 1970, pp. 19-22. The

National Bureau of Standards (NBS) is enlarging its role to cover the performance and safety of consumer products and quality of the environment. The Bureau's voluntary standards program which "is critical to the consumer effort" is expected "to get a boost from President Nixon's Consumer bill which Congress will be considering this session". "If the Administration's consumer policy works out, consumer products will bear government-sanctioned seals that guarantee certain standards of performance and safety. NBS would help develop and keep a check of those standards." Environmental quality in NBS affairs is now being reviewed by several task forces to assess the Bureau's capability and to explore future direction; among the areas being examined are air-pollution control, biomedical instrumentation, voluntary engineering standards, noise abatement, and telecommunications and electronics. As the NBS enlarges its areas of interest, it must deal with several problems, the primary one being that of "getting enough money . . . to do what the law says it must". Not only is the NBS's $37-million budget "over-committed", but it has a shortage of product-safety engineers and middle-management talent.

2023. "Housing 'Breakthrough' Plans", *Washington Science Trends*, v. 23, no. 21, 2 March 1970, p. 123. The Department of Housing and Urban Development has announced the selection of "22 housing system producers, including a number of advanced technology firms, to build prototype models in 'Operation Breakthrough' ". The consortia of organizations selected are headed by firms ranging from Aluminum Company of America to TRW Systems Group; these organizations "have an opportunity to demonstrate their products and skills, and possibly find a way to enter the housing market on a commercially feasible basis". "Total cost of the program was not announced, but there is little or no expectation that the program will be profitable, at this stage, for the organizations involved." "The selection marks another step in HUD Secretary George Romney's plan to demonstrate that industrial systems and techniques can be applied to 'break through to total new systems of housing production financing, marketing, management and land use'."

2024. "A New Study Seeks an Urban Payoff from Communications Technology", *News Report*, National Academy of Sciences, National Research Council, National Academy of Engineering, v. XX, no. 4, April 1970, p. 6. "A general inquiry by a National Academy of Engineering committee into telecommunications problems of urban government has led to a new study to determine what urban-management needs might be met by available or soon-to-be-available communications and electronics technology. The Committee on Telecommunications, which called last year for specific studies of urban communications needs, has begun a year-long survey to see where

communications and electronics technology can serve such varied municipal functions as police and fire protection, traffic management, pollution-sensing, and mass-transit operations. The committee, chaired by Dean Emeritus William L. Everitt of the College of Engineering of the University of Illinois, will look first at the needs of cities and then will attempt to find matching technology. The study is sponsored by the Department of Housing and Urban Development on behalf of a consortium of Federal agencies that include the Federal Communications Commission and the Departments of Commerce, Justice, and Transportation."

2025. "New R&D Complex Planned for Ground Transportation", *Product Engineering,* **v. 41, no. 4, 16 February 1970, p. 9.** "A transportation proving ground for rail and air-cushion vehicles may rival NASA's Manned Spacecraft Center in Houston for size and complexity. Besides stimulating new designs for ground transportation, this center will call for a great deal of engineering and test equipment. Sen. Gordon Allott . . . sponsor of the project, hopes it will attract engineering industries to the area, as the opening of new NASA facilities did during the 1960s. The Dept. of Transportation has chosen a site on nearly 30,000 acres of state land 12 mi. northeast of Pueblo, Colo. First cost, including a double-oval track, is estimated at $4 million, a sum awaiting Congressional approval. Eventual cost will exceed $50 million, with an operating budget of several million dollars a year for the testing of high-speed vehicles for the Federal Railroad Administration, the Office of High-Speed Ground Transportation, and probably the Urban Mass Transportation Administration."

2026. ***Science and Technology and Its Application to the Problems of Pollution, Transportation and Employment,*** **Background Reading for Western States Conference, 9-11 March 1970, Salt Lake City, Utah, prepared by the Federation of Rocky Mountain States, Inc., and the Western Governors Conference, 134 pp.** This report contains ten background papers for the conference on "Science and Technology and Its Application to the Problems of Pollution, Transportation and Employment". The papers were written with the following objectives for the conference in mind: (1) "stimulate discussion leading to answers to what government leaders and the science and technology community must do to set up the mechanism and lines of communication required to bring technology to bear on current public problems"; (2) "identify potential applications of new technology to social problems in the areas of pollution, transportation, employment and future planning"; (3) develop recommendations for federal, regional, interstate, state and local action in order to fully utilize science and technological resources, overcoming problems in federal-state relations, interagency relations, communications, financing,

manpower"; and (4) "determine how public officials can prepare themselves to administer science and technology programs and to define the scope and possible form and content of these programs". The papers are organized into the broad headings of government, science and technology, human resources, pollution, and transportation. (The report is available from the Federation of Rocky Mountain States, Inc., Suite 203, 1390 Logan, Denver, Colorado.)

2027. **Cape, W. H.,** ***Scientific and Technological Advice for Kansas Governments and Industry,*** **The University of Kansas Publications, Governmental Research Series no. 38, Lawrence, Kansas, 1969, 167 pp.** This monograph presents the results and analysis of a survey conducted for the purpose of determining how the State, local governments, and industry of Kansas "view scientific and technological matters and how they cope generally with the need for scientific and technological assistance". The survey focused on the role of the Research Foundation of Kansas and attempted to ascertain what State and local governments might do in relation to the stimulation and utilization of research. These topics are covered: "Organization and Financial Aspects of the Research Foundation of Kansas", "Selected Program Activities and Services of the Research Foundation of Kansas", "The Kansas Technical Services Program", "The Vocational Education Research Coordinating Unit", "Scientific and Technological Advice at the State Level", "Scientific and Technological Advice for City and County Governments", "Scientific and Technical Advice for the School Districts", and "Scientific and Technical Advice for the Courts". Needs, and possible further directions for meeting them, are discussed. (The report is available from The University of Kansas Publications, Lawrence, Kansas.)

3000 NEEDS AND ALLOCATION OF RESOURCES FOR SCIENCE

3011. ***American Science Manpower 1968,*** **A report of the National Register of Scientific and Technical Personnel, National Science Foundation, NSF 69-38, December 1969, 277 pp.** This publication, the seventh of a series conducted by the National Science Foundation, is based on the 298,000 scientists in the 1968 National Register of Scientific and Technical Personnel. It reports data on the supply, utilization, and characteristics of the nation's scientific manpower. Specific data provided include education, specialization by work activity and field, type of employer, salary, age, sex, and geographic distribution. Highlights of the information include: three-fifths of the registrants were in the physical and mathematical sciences, one-fifth in the life sciences, and the remainder in the behavioral and social sciences; industry employed 32 percent, educational institutions 40 percent, and the Federal Government 10 percent; one-third of the registrants were primarily engaged in R&D, 21 percent in teaching, and 21 percent in management or administration; eight states contained more than one-half of the total registrants; and the Federal Government provided funds for about 43 percent of the total registrants. (For sale by the U.S. Government Printing Office, Washington, D.C. 20402. Price: $2.00.)

3012. Grubel, H. G., "Foreign Scientists in the United States", ***Bulletin of the Atomic Scientists,*** **v. XXVI, no. 4, April 1970, pp. 9-12.** A statistical analysis of foreign-born and/or -educated scientists is given according to their countries of origin, backgrounds, and levels of education. Statistics are based on the 1966 U.S. "Register of Scientific and Technical Personnel". The data presented include the following: of the 242,756 scientists in the United States in that year, 2.0 percent were persons born abroad and fully educated in the U.S., 4.0 percent were born and educated abroad through high school but had obtained a highest degree in the U.S., and 3.5 percent were born and fully educated abroad; 6.1, 5.0, and 4.4 percent of the scientists employed in the fields of physics, biology, and chemistry, respectively, were fully educated abroad; foreign-born scientists comprised 17.8 percent of those engaged in basic research, 10.3 percent of those in applied research, and 8.9 percent in teaching; U.S. scientists born in Germany were the most numerous (3282) followed by those born in Canada (3097), China (2195), the United Kingdom (2041), India (1382), and Austria (1099).

3013. "Cuts Begin to Hurt", ***Science News,*** **v. 97, no. 11, 14 March 1970, p. 266.** The effect of the decline in federal funding of scientific research is partially reflected in the closing of certain major

laboratories and in the reduction or cancellation of programs in the fundamental biological and physical sciences. Among the institutions being curtailed or closed are (1) The Princeton-Pennsylvania Accelerator, (2) Cambridge Electron Accelerator, (3) The National Magnet Laboratory that may be cut back by 20 percent, (4) MIT's Haystack radio telescope at Lincoln Laboratory that may be forced to close, (5) Florida State University's tandem accelerator, and (6) The Sloan-Kettering Institute for Cancer Research, where seven laboratories are being closed and nine others are being reduced by 50 percent. Less support is being given for programs in the areas of genetics, plant physiology, biochemistry, nonpathogenic bacteria, viruses, astronomy, and geophysics. NSF is being pressured to take up 50 biological programs being dropped by NIH and 25 astronomy programs being dropped by other agencies although "the Foundation's budget does not call for generous increases in these categories, and it does not know where it will get the money".

3014. "DuBridge, McElroy, Daddario Comment on Budget Prospects", *Physics Today*, v. 23, no. 4, April 1970, p. 62. The status and prospects for federally supported university research, especially in the physics area, is briefly described. Research supported by the Department of Defense (DoD), NASA, and the Atomic Energy Commission is expected to decline in FY'71. "Only NSF, with a proposed $45 million increase for university research, projects a gain for 1971 among federal agencies that fund physics research." DoD support will drop by $20 million because of congressional action, according to Lee A. DuBridge; the Mansfield amendment is expected to account for only a small part of the cut. As a result, NSF is expecting increased "proposal pressure", according to William D. McElroy (NSF's director); the Foundation's small increase for support of physics "will not cover the inflationary rise in cost". As for NSF's budget request, Rep. E. Q. Daddario "feels that the outlook . . . is better than last year, that a major cut is unlikely".

3015. Boffey, P. M., "NSF Budget: House Group Reacts to Data on Plight of Science", *Science*, v. 168, no. 3927, 3 April 1970, pp. 95-97. "Complaints that recent budget cuts are inflicting great damage on the American scientific establishment seem to have moved the House Science and Astronautics Committee . . . to recommend that the National Science Foundation be allocated $27.6 million more for the next fiscal year than the Nixon Administration had requested." This recommendation does not ensure that NSF will receive the extra money because three other committees must still act on the NSF budget. "Nevertheless, the science committee's action is a significant indication that some congressmen are now convinced that American science is indeed in trouble." The Committee's action was based on recommendations of its Subcommittee on Science,

Research, and Development, headed by Rep. Emilio Daddario. Specific increases recommended by the Subcommittee are for graduate traineeships, academic science projects being terminated by mission agencies, the College Science Improvement Program, environmental research, and state and local government assistance.

3016. "Kennedy Asks More for NSF", *Science*, v. 168, no. 3929, 17 April 1970, p. 347. Senator Edward Kennedy, chairman of the Senate subcommittee which oversees the National Science Foundation (NSF), has introduced an authorization bill providing $50 million more than the $500 million requested for NSF by the Administration for the coming year. Since the Congressional appropriations committees make final budget decisions, "Kennedy's action could be less significant in affecting NSF's budget than in symbolizing his emergence as the leading congressional advocate of scientific research". In introducing the bill, "Kennedy said he recognized the need for belt-tightening in a time of inflation, but went on to say that 'even in a period of inflation, a responsible government must choose its priorities wisely; it cannot blindly slash every federal program. And it is my belief that no government with a proper set of priorities can, at this moment in history, seriously consider reducing its commitment to scientific research' ". He called for support of both applied and basic research and of academic science, especially in light of the fact that other agencies are being forced to drop academic projects.

3017. Strassenburg, A. A., "Supply and Demand for Physicists", *Physics Today*, v. 23, no. 4, April 1970, pp. 23-28. Current problems of employment for physicists are discussed in light of American Institute of Physics surveys of recently employed PhD's, employers, and graduate and undergraduate students. "The employment situation for physicists is at present in a state of imbalance, with supply exceeding demand, and there is no evidence for any rapid improvement." Highlights of the data include the following: "there has been a striking increase of postdoctorate fellows, from 28 percent in 1967 to 47 percent in 1969", probably due to the fact that "many graduate departments are keeping their own PhD's, on an emergency basis, until they find suitable employment"; fewer physicists are satisfied with their present job as evidenced by the number of employed PhD's who are looking for employment; unemployment was higher for 1969 graduates than for 1967 or 1968; the AIP placement service is being used by more PhD's but by fewer employers; reactions of industrial employers indicate "that the physics profession is suffering from overspecialization in graduate school, rapid obsolescence and competition from engineers who adapt more easily to applied research". Statistical and tabular data collected in the survey are included.

3018. "Engineering Employment is Down, But Not Out", *Product Engineering*, v. 41, no. 4, 16 February 1970, pp. 22, 24. This article presents engineering employment data from several major companies which show that although many are cutting back, those dealing with nondefense, commercial, and industrial manufacturing, are hiring. In the aerospace industry, engineers are being shifted to environmental and urban problems. These cutbacks and shifts in emphasis are due largely to the government economies in defense and space budgets. "One of the largest dents the government is making in engineering activity comes from cutting NASA's budget to $3.35 billion in fiscal year 1971, a cut that will mean elimination of 65,000 jobs, most of them with contractors and universities . . . 50 percent of the reduction will be among West Coast workers and 25 percent each in the South and Northeast." Some companies showing significant change are: Aerospace & Systems Office of North American Rockwell – cut 11,500 jobs last year and will cut another 5000 by the end of 1970; Boeing – 1000 engineers were let go in 1969, 2000 are expected to depart in 1970; General Dynamics – 2500 would be cut if the F-111 continues, if it is cancelled the entire Fort Worth plant could be closed. "Most companies with a few exceptions – Boeing, for one – are recruiting at colleges this year, though at much lower levels than last year."

4020. *Astronautics and Aeronautics, 1968,* **Chronology on Science, Technology, and Policy, NASA SP-4010, National Aeronautics and Space Administration, Scientific and Technical Information Division, Washington, D.C., 1969, 429 pp.** "This chronicle covering aeronautical and space events in 1968 is, like its predecessors volumes, a tentative step in the process of documentation and writing of history. . . . it attempts to sort out the rising crescendo of events, decisions, and personalities into the sequence of their happening." This history of space-related events for 1968 provides a review of space, flights, policy statements, press conferences and newspaper articles, as well as summaries of the scientific results of each launch during the year. In addition to the monthly entries, four appendices are included: "Satellites, Space Probes, and Manned Space Flights, 1968"; "Major NASA Launches, 1968"; "Chronology of Manned Space Flight, 1967-1968"; and "Abbreviations of References". Additional aids included are an "Index and List of Abbreviations and Acronymns" and a list of NASA historical publications. (This report may be obtained from the U.S. Government Printing Office, Washington, D.C. 20402. Price $2.00.)

4021. *Lunar Exploration: Strategy for Research 1969-1975,* **Report of a Study by the Space Science Board, National Academy of Sciences, Washington, D.C., 1969, 40 pp.** A plan and strategy for scientific lunar exploration is presented that calls for "a shift of emphasis from technological development to an exploitation of existing Apollo technology for scientific objectives". The report offers several recommendations for the overall Apollo program as well as more specific suggestions for research in areas such as lunar-age measurements, geochemistry and petrology, geophysics, geology and geomorphology, and lunar-science management. The Board calls for the use of existing Apollo technology for lunar research and expresses strong opposition to "large-scale technological innovations involving manned spaceflight, to the detriment of . . . scientific explorations that fully exploit current technology". Other recommendations of the Board include certain "modest extensions of the Apollo technology", an increased interval of time between missions, a surface vehicle for greater lunar mobility, greater use of orbiting satellites and remote sensing techniques, an increased role for scientists in determining "both basic policy and mission hardware", and NASA support of "lunar experiment definition as an integral part of its Apollo program". (The report is available from the Space Science Board, 2101 Constitution Avenue, Washington, D.C. 20418.)

4022. Normyle, W. J., "House Leaders Concur on NASA Budget", *Aviation Week & Space Technology,* **v. 92, no. 13, 30 March 1970,**

pp. 22-23. "Debate on the House floor over the National Aeronautics and Space Administration's Fiscal 1971 budget proposal . . . may already have been settled by sub rosa understandings among key congressmen to reduce the total by $300 million. At issue will be the report on the Fiscal 1971 NASA authorization bill by the House Committee on Science and Astronautics. The committee, adhering to recommendations of subcommittees, voted to increase the Nixon Administration's request for new obligational authority by $300 million, from $3.33 billion." The budget would be increased in the areas of Saturn-5 launch vehicle, Apollo lunar payloads, and space-flight operations, including shuttle systems. "The additional $300 million probably will be cut from the authorization bill." "The final outlook, when both House and Senate have agreed on a compromise, appears to be a cut in NASA's budget request of between $100 million and $200 million, down to as low as $3.1 billion."

4023. "NASA Panel Ask Doubling of Space Astronomy Funds", ***Physics Today,*** **v. 23, no. 4, April 1970, p. 65.** "After two years of study, a panel of 19 NASA consultants . . . has recommended a program of space astronomy for the 1970's that will cost a minimum of double the present figure of $125 million per year. The basic motivation is the ability to use in space those portions of the electromagnetic spectrum that do not penetrate the earth's atmosphere to ground-based instruments. Such observations, the panel says, could help solve mysteries like the primeval fireball, the pulsars, laser action in space, and other recent discoveries." The panel specifically recommends: (1) use of high payload Explorer spacecraft for X-ray and gamma-ray astronomy; (2) larger and larger Orbiting Astronomical Observatories until a large space telescope (120-inch aperture) can be launched in the 1980's; (3) improvement of detectors and cooling systems for infrared astronomy; (4) development of radio telescopes up to 10 km in diameter for long-wave radio observations; (5) more sophisticated solar spacecraft; and (6) improved instrumentation for studying the interplanetary medium, cosmic rays, and magnetic fields.

4024. Lewis, R. S., "Evolution in NASA: Loss and Cost of Transition", ***Bulletin of the Atomic Scientists,*** **v. XXVI, no. 4, April 1970, pp. 28-29.** The author discusses some consequences of the federal cut-back in the civilian space program, particularly with regard to the "dissipation of human resources" and the loss of engineering and technical teams that were recruited and trained to develop the Saturn-Apollo vehicle system. "The National Aeronautics and Space Administration's budget for the 1971 fiscal year calls for a $3.4 billion expenditure, the lowest since 1962, and a total labor force of 144,000" (down from the 1966 level of 420,000). "Once scattered, the teams that built successful vehicles may never be reassembled . . . many of the people who learned spacework in the 1960s will have

become settled eventually in other kinds of employment in the 1970s. The national resource which their collective skills and experiences represent will have been lost." The new space program, with plans for reusable space vehicles and station modules which can be employed as laboratories, is briefly discussed.

4025. Normyle, W. J., "Nixon Space Policy Lacks Funding Level Commitment", *Aviation Week & Space Technology*, v. 92, no. 11, 16 March 1970, pp. 19-20. "President Nixon's plan for future U.S. exploration of space is the most comprehensive ever proposed. But it lacks a commitment to specific spending and lays the groundwork only for a judiciously paced budget level over the next decade." Under the fiscal 1971 budget, NASA would operate at the lowest level in seven years. "Nevertheless, officials . . . expressed satisfaction with the recent White House message." Nixon proposed six objectives: continued exploration of the moon; exploration of the planets and the universe; substantial reduction of the cost of space operations; extension of man's capability to function in space for increasingly longer periods; expansion of the practical application of space technology to the benefit of the earth; encouragement of greater international cooperation in space. Details of plans for achieving these objectives are discussed. With regard to exploration of the planets, one long-range goal is a manned expedition to Mars. However, prerequisites to this expedition include a substantial reduction in the cost of space operations and a demonstration of man's ability to live and work efficiently for long periods in space.

4026. *The Future of the Bioscience Program*, Hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-First Congress, November 1969, 1970, 244 pp. These hearings were called to explore the future of the U.S. bioscience program in space. Of particular concern in the hearings was the adequacy of NASA's current and planned programs in bioscience as they relate to the safety and effective functioning of astronauts in extended space flights. Questions dealing with the following topics were discussed: the need for further unmanned biological experiments; NASA's plans for accomplishing these experiments; present status of these plans; the best way to accomplish the experimental program; and NASA's cancellation of its Biosatellite Program. Those presenting testimony included John E. Naugle, Orr E. Reynolds, and John W. Dyer (all of NASA), as well as representatives from the medical and scientific communities. (The Hearings are available from the Government Printing Office, Washington, D.C. 20402.)

4027. Walsh, J., "Space Program: More Time for Biomedical Research?", *Science*, v. 167, no. 3924, 13 March 1970, pp.

1469-1471. The history of scientific research in NASA's space program is outlined and speculation regarding the future role of biomedical research is presented. "Ever since the moon program got off the ground in the early sixties NASA has been the target of running criticism from the scientific community for paying insufficient heed to basic research." Recently a report of the President's Science Advisory Committee "argued that the focus of efforts in biomedical research for manned space flight 'should be shifted from tolerance for flights of long duration to modes and levels of effectiveness of man-assisted systems on the moon and in earth orbit . . . We are convinced that the necessary biomedical foundations for the design of optimum flight programs to explore such questions do not exist' ". The report said that NASA must therefore undertake a major modification of its approach to space biomedicine. "The NASA answer to why a formal basic research program wasn't flown seems to be that finite resources and operational priorities prevented it."

4028. "New Role for NASA Research Center", *Science*, v. 168, no. 3927, 3 April 1970, p. 100. The Administration has announced that the Department of Transportation (DOT) will take over NASA's Electronics Research Center in Cambridge, Massachusetts, when the space agency vacates on June 30. The $36-million facility will be renamed the Transportation Development Center and, according to DOT Secretary John Volpe, will "undertake advanced research in automated air traffic control, electronic guidance systems for highways, and antipollution research". Volpe said that a majority of the present 825 employees would be retained and that James C. Elms would stay on as director. A budget of about $20 million is planned for next year. "If the NASA and DOT proponents are right it may not require so wild a transition to bring space electronics research down to earth and deploy it against the problems of air traffic control and collision avoidance, pollution, and urban transit and highway traffic control."

4029. Normyle, W. J., "White House Study Urges Space Advances", *Aviation Week & Space Technology*, v. 92, no. 12, 23 March 1970, pp. 20-21. An "era of new aerospace technology is urged in a comprehensive study of future U.S. capabilities by the . . . Office of Science and Technology. The report recommends the development of new technology in three main areas: expansion of capability for automated equipment controlled by man in a remote location . . . reduction of the expense of access to and operations in space using the current expendable launch vehicles . . . [and] ultimate development of a reusable space transportation system . . ." "Manned space flight activities, and particularly development of the space shuttle as a satellite transportation system, was given a key role in the plan for future exploration." Three prerequisites for a manned mission to

Mars were outlined: "return of data from precursor unmanned mission to indicate some potential benefit . . . that would make it a high-priority national or international objective . . . demonstration during long-duration missions in earth orbit that man could function efficiently during a roundtrip flight to Mars lasting as long as three years, [and] advances in technology to sharply reduce the cost of a manned planetary expendition". The report predicted that "such prerequisites could be fulfilled so that a manned mission to Mars might be started in 1985".

4030. "National Oceanographic Program – 1969", Parts I and II, Hearings before the Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries, House of Representatives, Ninety-First Congress, Serial No. 91-5 (Part I), 511 pp., Serial No. 91-13 (Part II), 1278 pp., 1969. The purpose of the first part of these hearings, held between January-June 1969, was to review and discuss the report prepared by the Commission on Marine Science, Engineering, and Resources entitled "Our Nation and the Sea". Commission members as well as other representatives focused their discussions on the recommendations of the report to establish a national oceanographic program. The second part of the hearings, held between August-October 1969, continued the discussion of the Commission's report and "considered three long-range programs of research, development, technical services, exploration, and utilization with respect to our marine and atmospheric environment". Particular attention was given to two of the Commission's recommendations in the hearings: establishment of a National Oceanic and Atmospheric Agency and the creation of a National Advisory Committee. Testimony was presented by private-sector representatives as well as by the federal agencies most affected by the Committee's recommendations. (The Hearings are available from the Committee on Merchant Marine and Fisheries, U.S. House of Representatives, Washington, D.C. 20515.)

4031. ***Marine Science Affairs – Selecting Priority Programs,*** **Annual Report of the President to the Congress on Marine Resources and Engineering Development, April 1970, 284 pp.** This fourth Annual Report of the National Council on Marine Resources and Engineering Development "reviews the activities and accomplishments of all Federal departments and agencies in the field of marine sciences during 1969, and evaluates these accomplishments in terms of the objectives of the Marine Sciences Act". "A fundamental precept guiding Federal marine science activities during the past year has been that of preserving the quality of the environment." The report describes the priorities that have been selected for the federal marine science program for fiscal year 1971 with emphasis on development of plans for coastal zone management, coastal zone research, lake

restoration, Arctic research, and U.S. participation in the International Decade of Ocean Exploration. The report describes federal programs that serve the following public purposes: "facilitating transport and trade, developing nonliving marine resources, gaining a greater understanding of the marine environment and an improved ability to predict its processes, improving national use of ocean data, strengthening military programs for national security, accelerating use of food from the sea, improving the training and education of marine science manpower, and expanding national capabilities to work in the sea". (For sale by the U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.50.)

4032. "The Deep Six for NOAA", *Science News*, v. 97, no. 11, 14 March 1970, p. 267. The problems and prospects of establishing the proposed National Oceanic and Atmospheric Agency (NOAA) are discussed and related to the Administration's plan for reorganizing the Department of Interior to encompass marine science activities. The proponents of the NOAA are pessimistic that the proposed agency will become a reality even though legislation to create NOAA has been introduced in both the House and the Senate. In spite of much support for NOAA, the "Nixon Administration has been markedly unenthusiastic"; in addition, several agency heads have urged "that no formal action on NOAA legislation be taken" until the year-long study of the Council on Executive Organization is completed. The "Council's thinking has definitely been in the direction of incorporating ocean activities within Interior rather than within a new agency". Under the Administration's emerging plan, the Department of Interior would be reorganized to include most of the agencies and activities that were recommended for inclusion in NOAA. But proponents of NOAA had "hoped for the status, prestige and budgetary muscle of an independent agency"; they fear that "incorporation within Interior would torpedo the whole ocean program".

4033. "Keeping Plowshare Alive", *Nature*, v. 225, no. 5237, 14 March 1970, pp. 992-993. The current budget for the Atomic Energy Commission's Project Plowshare is only $14.5 million, about half of its requested $29 million. "The chief effort of the new financial restrictions in the coming year is that there will be no experiments with nuclear explosions intended for excavation but only laboratory analysis of work already carried out." "[Also] AEC will have to postpone its plans for making elements with atomic number greater than 104 by the use of nuclear explosions." "The extent to which tales of what the Russians are doing [in the area] will melt the heart of Congress remains to be seen." Implications of the budget cuts for AEC's plans are discussed. Most of the Plowshare budget will be spent on "research, partly in the design of improved explosives,

partly in the better understanding of the mechanical effects of nuclear explosions and partly in trying to anticipate the production of radioactivity in novel circumstances ... and the production of geothermal heat".

4034. "Weather Modification: What Happens Now?", *Washington Science Trends*, v. XXIV, no. 1, 13 April 1970, p. 1. The Assistant Secretary of Commerce for Science and Technology, Myron Tribus, has proposed that "work begin in operational weather modification programs using existing technology 'whenever the expected social benefits outweigh the costs' ". Tribus said that knowledge "firmly in hand" is sufficient for weather modification in two areas: to increase rainfall in some tropical regions, and to increase or decrease the snowpack in mountains. He also called for further research involving hailstorms, cumulus clouds, lake and coastal zone storm moderation, and hurricane and lightning modification. "However, Tribus conceded that any attempts to alter the weather or the climate must face many conflicting public and private interests, and human and social considerations." "The moral burden", he said, "will be heavy on the individuals – scientists and engineers – who originate operations."

5000 SCIENCE, EDUCATION, AND THE UNIVERSITY

5009. "Nixon Asks for Education Foundation", *Washington Science Trends*, v. 23, no. 24, 23 March 1970, p. 142. President Nixon has proposed the creation of a National Foundation for Higher Education, with authority to make grants to support "excellence, innovation and reform in private and public institutions". "The proposal to set up an educational counterpart to the National Science Foundation was accompanied by statements indicating such grants would permit institutions more freedom from what has been termed 'task-oriented' funding." "The President said that previous policies have brought about 'a serious distortion of our centers of academic excellence'. The statement appeared to mirror complaints that many American colleges and universities have been so heavily engaged in military, space and other Federal programs they have assigned the education of students to a secondary role." Other aspects of the proposed program include job training and career education programs in community colleges and technical institutes, as well as student financial aid arrangements.

5010. "Federal Support of Research and Development at Universities and Colleges and Selected Nonprofit Institutions, Fiscal Year 1968", National Science Foundation, NSF 69-33, Washington, D.C., September 1969, 111 pp. This is the first of a series of annual reports that will provide data on federal obligations for R&D and R&D plants at individual U.S. universities and colleges, selected independent nonprofit research institutions, and Federally Funded Research and Development Centers (FFRDC). Twelve government agencies provided data for the report, including information on 620 universities and colleges, 64 independent nonprofit institutions, and 67 FFRDC's. Highlights of the data, that are organized largely in tabular form include: federal obligations to universities and colleges for R&D totaled $1416 million in fiscal year 1968; federal funds for R&D plants at institutions of higher education totaled $102 million; over 600 universities and colleges received federal R&D support in fiscal year 1968 as compared to less than 500 in 1963; academic institutions in the Pacific division were the leading recipients of R&D funding, receiving about one-fifth of the U.S. total; the general shift in the pattern of federal support between 1963 and 1968 was the result of enlarged programs within the Department of Health, Education, and Welfare; federal obligations to FFRDC's associated with academic institutions totaled $945 million; the nonprofit institutions included in the survey received $194 million for R&D and R&D-plant activities. (For sale by the U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.25.)

5011. Cunningham, D. E., *Federal Support and Stimulation of Interdisciplinary Research in Universities,* Miami University Research 69-142, NASA, N70-21072, October 1969, 73 pp. A study conducted to determine what actions the various agencies of the Federal Government have been taking with regard to promoting interdisciplinary research in the university setting concludes that "results so far have been less than outstanding". The problems center around the lack of appropriate administrative structures within the universities, federal limitations on the various forms of support, and the discipline-oriented federal agencies themselves. The report is divided into five major sections: the first defines and discusses the need for interdisciplinary research, the second describes major forms of federal support of research, the third presents general limitations to the stimulation of interdisciplinary research, the fourth presents the existing interdisciplinary research programs within the various federal agencies, and the fifth presents conclusions and recommendations for promoting interdisciplinary research in universities. An appendix, "Some General Considerations on Awarding Interdisciplinary Grants", is added "as an operational guide to some factors affecting the university's ability to perform interdisciplinary research". (The report is available from Scientific and Technical Information Division, NASA, Washington, D.C. 20546.)

5012. *Support of Full-Time Graduate Students in the Sciences, Fall 1967,* National Science Foundation, NSF 69-34, June 1969, 157 pp. This report presents statistical information on support mechanisms and major support sources of graduate students in the sciences. Findings of the report included the following: in the Fall of 1967 there were some 134,000 full-time science graduate students, one sixth of whom were foreign citizens; about one third of the students held fellowships-traineeships, while the remainder were supported in about equal numbers by research assistantships, teaching assistantships, and "other" mechanisms. Nonfederal funds provided major support for about three fifths of the students, and federal funds were the major support for the remainder excluding those supported by foreign funds. Federal funds supported nearly three fourths of the fellowships-traineeships and about two thirds of the research assistantships. The report concludes that the patterns of graduate student support "reflects the consequences of national decisions thus far made about how graduate science education students in the form of fellowships-traineeships and as indirect support to students as a concomitant of the support of research". (For sale by the U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.25.)

5013. "Are Graduate Students Worth Keeping", *Nature,* v. 225, no. 5237, 14 March 1970, pp. 985-986. The possible consequences of reduced federal support of graduate students are discussed and some

actions that universities should take are suggested. "What has happened . . . is that the Administration has repudiated its responsibility for graduate education." This decision will greatly reduce the number of university graduates in 1971 and possibly in 1970. As for the university response, it is suggested that they ask themselves whether the pattern of graduate education (especially overspecialization) "is really the best suited for the modern world". A change away from present directions, it is suggested, may be the more effective action the universities can take in order "to have the cuts in the traineeships restored". If the universities can "rise successfully to the challenge, and can make a stronger and more coherent case . . . for the importance of training graduates, the present crises may be a blessing in disguise. Otherwise, it will be a disaster".

5014. ***Sustaining University Program Research, 1969,*** **National Aeronautics and Space Administration, 1969, 133 pp. (plus Appendix).** This document presents a brief description of each research project supported by NASA under its Sustaining University Program. These projects are compiled alphabetically by state and university within the state, and cross-referenced by subject or research field. For the 1970's, one of the "highest priorities . . . will be the improvement of university capability to understand and contribute to the solution of broad interdisciplinary problems. Other . . . objectives include the development of new aerospace research capability in areas of regional importance, the advancement of national capabilities in science and technology, the promotion of working relationships between universities and NASA research centers, the assessment of NASA management experience for possible transfer and application to other national programs, and the consideration of the social and economic implications of scientific and technological advancement". **(The report can be obtained from the Office of University Affairs, Code Y, National Aeronautics and Space Administration, Washington, D.C. 20546.)**

6000 SCIENCE MANAGEMENT AND POLICY-MAKING BODIES

6020. "Government Interest in Technology Assessment Grows", *Physics Today*, v. 23, no. 4, April 1970, pp. 61-62. "Recent developments in Washington indicated that so-called 'technology assessment' will play a major role in U.S. science policy and in government funding of research and development in the 1970's." NSF Director William D. McElroy has said that "the Foundation plans to supplement many of its efforts to meet the new national concerns of environmental quality and social relevance" and emphasized "the importance of technology assessment in coping with these critical problems of the 1970's". Last November and December the Daddario Subcommittee on Science, Research and Development of the House Science and Astronautics Committee held hearings on the main theme of how Congress could acquire a 'technology assessment capability'. Daddario is introducing a bill to provide a means of technology assessment for Congress; three reports on technology assessment submitted to the Subcommittee last July are briefly discussed.

6021. "Technology Assessment: Feeling Their Way", *Science News*, v. 97, no. 10, 7 March 1970, pp. 240-241. "The National Science Foundation is asking for $28 million in fiscal 1971 for three programs, each of which plans to support some aspect of technology assessment research. And NSF plans soon to begin issuing $6 million in fiscal 1970 funds for its new Interdisciplinary Research Relevant to the Problems of Society (IRRPOS)." There is a determined effort to implement a technology assessment, but just how is now clear. NSF planners are looking to existing efforts as possible prototypes to follow. Dr. Joel Snow, IRRPOS chief, believes there is no one methodology for technology assessment and that "each problem will have to be considered on its own merits, and procedures designed for it alone". The political and economic future of technology assessments depends upon review by the House Committee on Science and Astronautics and by the Committee on Appropriations. At the same time, many new bills are being introduced in Congress "aimed at creating new ways to look at emerging technology" and many private groups are interested in technology assessment.

6022. Lear, J., "Predicting the Consequences of Technology", *Saturday Review*, 28 March 1970, pp. 44-46. A bill creating an Office of Technology Assessment has been drafted by Congressional specialists at the request of Rep. Emilio Q. Daddario. Because "emergent national problems, physical and social, are of such a nature and are developing at such an unprecedented rate as to constitute a major threat to the security and general welfare of the United States", it is

imperative "for the Congress to equip itself to assess technological developments, predict the probable consequences, and act to protect the American people against adverse results while assuring the nation of all possible benefits". The history of Congressional interest in technology assessment and the responsibilities of the new office are outlined. The function of the OTA would be "to draw together ad hoc assessment panels, and then to present the findings of these panels to the Congress in the form of sets of alternative consequences, to be chosen among and dealt with according to national goals".

6023. "The Technology Assessment Act of 1970", *Congressional Record*, v. 116, no. 61, 16 April 1970, pp. H3225-H3226. This address by Rep. Emilio Q. Daddario introduces his bill to establish an Office of Technology Assessment. The address outlines the background to the bill and describes its major provisions. "The sole purpose of this bill is to equip the Congress with a new office . . . whose chief responsibility will be to aid the Congress in dealing rapidly with the myriad technological issues approaching it, to help solve the problems they bring and seize the opportunities they offer." The proposed Office, which would be initially funded for $5 million for FY '71, would provide assessment capability for Congress. The bill enumerates the duties of the Office and authorizes it to obtain assistance from the Legislative Reference Service of the Library of Congress, the National Science Foundation, and the General Accounting Office. The OTA "would not itself be a large operational unit. But it would know how and where to go to get assessments done; it could put together ad hoc task forces for this purpose, and it would have money to pay for them".

6024. Mayo, L. H., *Some Legal, Jurisdictional, and Operational Implications of a Congressional Technology Assessment Component*, Staff Discussion Paper 207, Program of Policy Studies in Science and Technology, The George Washington University, December 1969, 56 pp. This paper includes "(1) the positing of a hypothetical Technology Assessment Component for legislative support; (2) the posing of a number of questions relating to the operational context of this assessment component, including the Organizational/Operational Framework, General Operational Problems, Access to Relevant Information, and the Utilization of Assessment Data and Analyses; and (3) some selected comments relevant to the questions posed". The proposed Assessment Component consists of an Office of Technology Assessment, which "will perform a variety of assessment tasks in support of Congressional decision making" and a Joint Select Committee on Technology and Society which "will focus attention on the general problem of the application of technological resources to social needs". A detailed description and explanation of the Assessment

Component are presented. According to the author, "the initiation of a more systematic and comprehensive technology assessment function presents not only an opportunity to usefully apply new technological skills but in so doing should encourage a broadened spectrum of public participation". (The report is available from The George Washington University, Washington, D.C.)

6025. Wormuth, F. O., "Government and Science", *The Center Magazine*, v. 3, no. 2, March/April 1970, pp. 41-46. Present government agencies and mechanisms for controlling the harmful effects of science and technology are assessed and a new administrative agency – a "Public Science Council" – is proposed for this purpose. Several instances are cited in which both operational and regulatory agencies of the government have failed to consider and evaluate harmful activities and experiments involved in government-supported R&D; from this, the author suggests that the "power to make rules should not be entrusted to those who will be governed by those rules". He calls instead for the creation of a Public Science Council which would "have power to make rules for . . . the . . . operating agencies which it supervises. It would review particular tests or activities before they were undertaken, and . . . its rule-making and authorization of tests would occur only after a hearing in which adversary procedure was employed". A given project "should be approved only if the . . . Council finds that there is reasonable grounds for undertaking the experiment and no reasonable grounds for expecting harmful results".

6026. Coates, V. T., *Examples of Technology Assessments for the Federal Government*, Program of Policy Studies in Science and Technology, The George Washington University, Washington, D.C., Staff Discussion Paper 208, January 1970, 44 pp. This report discusses the evolution and need for methods of technology assessments and presents the results of an exploratory study, the purpose of which was to develop systematic methods of mapping the "fragmented process" of technology assessment, "as it now works", in the executive and legislature branches of the government. Technology assessments for the Federal Government were found to fall into three main categories: the staff efforts, the interdepartmental efforts, and the work of a distinguished panel. "Assessments may be *anticipatory;* that is they may attempt to forecast coming developments in technology, or they may be *reactive* to perceived social problems or to long-range trends. A third possibility is that assessment is performed in response to ecological, social, or environmental disaster . . ." Most of the assessments examined "were performed by collecting, intergrating, analyzing existing data". (The report is available from The George Washington University, Washington, D.C.)

6027. Marx, B. S., *Early Experiences with the Hazards of Medical Use of X-Rays: 1896-1906*, A Technology Assessment Case Study, Staff

Discussion Paper 205, Program of Policy Studies in Science and Technology, The George Washington University, 71 pp. This report presents information on representative early experiences with the hazards of medical X-rays during the first decade of their use (1896-1906) and proposes a model describing the major phases of a technology-assessment process. The first part of the paper, based on an extensive literature survey, is a history of the use of X-rays and the early awareness of their harmful effects. The second part deals with conclusions drawn from the "diffusion of a new technological application and the process by which its hazards first come to be known, communicated, assessed, and controlled". The third part described the phases of a technology assessment process as (1) identification, during which the hazards and the causes of the hazards are determined; (2) assessment, during which information about remedies and their effectiveness is gathered; and (3) control, which focuses on means of controlling the hazards. The data on the early assessment of medical X-rays are then related to the activities of each phase of the model. (The report is available from The George Washington University, Washington, D.C.)

6028. Folk, H., *The Role of Technology Assessment in Public Policy*, Program on Social Implications of Science and Technology, University of Illinois, 29 December 1969, 10 pp. Technology assessment is viewed as a part of the public policy-making process and is discussed in terms of the political context in which assessments must be performed and acted upon. "The distrust of politicians for scientists' judgement, and of scientists for politicians' honesty and intelligence is the critical political problem in technology assessment." Furthermore, the current models of assessment – as presented in the recent reports of the National Academies of Science and Engineering on technology assessment – propose a division of political responsibility between scientists and politicians "that few politicians are willing to accept". As for the role of scientists in assessment, the author contends that "outside experts are either inexperienced in the area under study or are unlikely to be very good at technology assessment". To illustrate these and related problems, the author discusses the assessments attempted by the National Academy of Engineering. His overall conclusion is that adversary proceedings employing counter assessors is a preferred assessment mechanism to the proposed expert-panel approach. (This paper was presented at the 1969 meeting of the AAAS and can be obtained from the author. Write to Director, Program on Social Implications of Science and Technology, University of Illinois, Urbana-Champaign, Illinois.)

6029. Lepkowski, W., "Federal Technology Policy Begins to take Shape", *Product Engineering*, 16 February 1970, pp. 24-26. The several new directions and reorganizations for science and technology

initiated by the Nixon administration are noted and briefly discussed. "The National Bureau of Standards, for example, is preparing to champion the consumer; the National Science Foundation is shifting its aims to support sciences that have a social impact; and the entire government is preparing for a vast bureaucratic shakeup as President Nixon declares 'environment' as his top domestic concern for the '70s." These and other changes are described. In addition, the major technical issues facing the Congress are cited in such areas as defense, technology transfer, transportation, pollution, space, and technology assessment.

6030. "Reorganization of the Federal Research Administrative Structure for Research and Advanced Study", *Congressional Record,* 27 April 1970, pp. H3519-H3521. Rep. Emilio Q. Daddario discusses a report recently issued by his Subcommittee on Science, Research, and Development that calls for formation of the "National Institutes of Research and Advanced Studies" (NIRAS). After describing the need for consolidating "those scientific activities which are carried out in universities or similar institutions" including "higher education and advanced study", Daddario lists the organizations that would be integrated into NIRAS. These include the National Science Foundation, graduate education programs of HEW and other departments, National Foundations for the Arts and the Humanities, and new units called the National Institute of Ecology and the National Institute of Social Sciences. In addition, the report calls for a strengthening of the Office of Science and Technology to "perform the overall coordination and planning role for all R&D and higher education related to science".

6031. "New Directions for NSF", *BioScience,* v. 20, no. 7, 1 April 1970, p. 430. During testimony before the House Subcommittee on Science Research and Development, National Science Foundation Director, William D. McElroy, said that NSF, "in response to growing national concern, will redirect many of its efforts in research on the environment and other problems of social relevance". NSF is seeking an authorization of $511 million for FY 1971, an increase of $73 million over the current fiscal year. Specific items that reflect NSF's new directions are: "initiation of the Foundation's lead agency responsibility for the International Decade of Ocean Exploration"; " 'technology assessment' of the overall effects of a current or potential technology on the natural or social environment"; "increased support for student-initiated, student-managed, and student-conducted research projects"; and "increased support for the social sciences, including a significant involvement in the new program, Interdisciplinary Research Relevant to Problems of Our Society".

6032. Walsh, J., "NSF: White House Nominates Four to Long-Unfilled Posts", *Science,* v. 168, no. 3927, 3 April 1970, pp. 101-102. The White House has "nominated four men to the National Science Foundation (NSF) assistant directorships which were created in 1968 and have yet to be filled. No nomination for the agency's number two post, the deputy directorship, was put forward". The four nominees, whose appointment must be confirmed by the Senate, are: as assistant director of research, Edward C. Creutz, now vice president in charge of research and development for Gulf General Atomic; as assistant director for education, Lloyd G. Humphreys, professor of psychology at the University of Illinois; as assistant director for institutional programs, Louis Levin, executive associate director of NSF; as assistant director for national and international programs, Rear Admiral Thomas B. Owens, chief of naval research. "The appointments, and an agency reorganization which is now being carried through, give NSF director William McElroy an unusual opportunity to influence the agency's aims and methods of operation."

6033. Boffey, P. M., "Mansfield Amendment Curb on Basic Research May Spread", *Science,* v. 167, no. 3924, 13 March 1970, p. 1473. "Prominent scientists and congressional supporters of science . . . fear that the spirit of the so-called Mansfield amendment, which is intended to restrict the kind of research that the Defense Department can support, is now spreading to many civilian agencies as well." As a result of the amendment, "the Defense Department will cancel some $50 million in research support". Research areas to be reduced or terminated include the Florida State tandem accelerator, the National Magnet Laboratory at M.I.T., and the Haystack radio telescope at M.I.T. Other agencies, such as the National Institutes of Health, have narrowed down their view of "what areas of science are appropriate" for research, according to Philip Handler, president of the National Academy of Sciences. Congressmen Daddario and Mosher of the House Subcommittee on Science, Research and Development "hope primarily to ensure that the amendment is implemented cautiously and that a mechanism is set up to make certain that outstanding scientific projects are not junked precipitously".

6034. Walsh, J., "HEW: What Will Decentralization Mean to Research Evaluation?", *Science,* v. 168, no. 3928, 10 April 1970, pp. 231-234. This article examines the problems facing the Nixon Administration in attempting to decentralize the Department of Health, Education, and Welfare (HEW). "The aim is both to improve efficiency and to better the performance of the department in achieving priorities established by the Secretary." The decentralization program "involves a major shift to regional officials of authority and responsibilities for HEW's far-flung grant-in-aid programs". "Among HEW's research

clientele in the universities and health and welfare institutions there is rising concern that decentralization will involve a sharp reduction in influence of the study-section review system under which professionals from outside government provide scientific evaluation of HEW research and training activities." The program includes "a major effort . . . to bring state and local officials together with federal officials from different agencies to develop viable regional plans". In the preparations for decentralization, a Federal Assistance Task Force (FAST) has been studying HEW's grant-in-aid programs for the past year and will examine basic research this year.

6035. Coddington, D. C., and Milliken, J. G., "Future of Federal Contract Research Centers", *Harvard Business Review,* v. 48, no. 2, March/April 1970, pp. 103-116. This article presents highlights of a report on a recently completed study of 40 federal contract research centers (FCRCs). The authors describe the centers in general, itemize their advantages and disadvantages, "analyze the claims that the centers should be controlled more closely, discuss the problem of centers whose primary missions have been accomplished, examine the multiple-sponsorship question, and make predictions concerning the future role of such centers". The major characteristic of the centers is their "heavy financial dependency on a single customer or sponsor", usually a federal agency. Advantages include "staff expertise, objectivity, freedom to concentrate on sponsor problems, and quick response". Drawbacks include "high costs relative to other types of federal R&D performers . . . adverse effects on federal in-house competence . . . unfair advantage in obtaining federal R&D work" and exerting undue influence on federal policy-making. Issues discussed include the amount of independence and diversification for an FCRC and the alternatives available to a center that has completed its original mission. The authors conclude that despite "the difficulties it has caused and seems destined to cause in the future, the FCRC organizational form should continue to be a valuable R&D option to the federal government".

6036. Moravcsik, M. J., "Reflections on National Laboratories", *Bulletin of the Atomic Scientists,* v. XXVI, no. 2, February 1970, pp. 11-15. This article is essentially "a collection of comments on some aspects of national laboratories by one who has had an opportunity to observe and participate in national laboratories for over a decade". It includes a comparison of the national laboratory with the university and some suggestions for improving the image of the national laboratory. According to the author, there are several justifications for national laboratories: they can do "big science" better than any other type of organization, they can pursue basic research in areas which have predictable application, and they can accommodate research scientists who are not suited to the university atmosphere. To

accomplish the latter, the author recommends that salaries of senior scientists be increased, that some features of the university be added to the structure of national laboratories, and that the geographical location of laboratories be improved. The author concludes that "national laboratories represent an important element in the diversity of research patterns" and that "some changes in their stated goals, their structure, and their everyday practices are needed to enhance their productivity and usefulness".

6037. Boffey, P. M., "Nader's Raiders on the FDA: Science and Scientists Misused", *Science,* v. 168, no. 3929, pp. 349-352. This article discusses a recent report issued by a task force headed by Ralph Nader and based on a four-month study of the Food and Drug Administration (FDA). "The Nader report is a sweeping indictment of virtually all of the FDA's food protection programs, which are described as in a state of 'total collapse'." The report charges that the FDA "has succumbed to political pressures; has adopted food regulations that 'read like a catalogue of favors to special industrial interests'; has been unable and unwilling to protect the consumer; and has deliberately misled the public and Congress". A press release accompanying the report "claims that 'the FDA regularly tailored its scientific activities to support already arrived at administrative positions' and that 'scientific opinions . . . have been distorted, altered, misrepresented and ignored, allowing serious potential health hazards to go unreported or uncorrected for indefensible periods of time' ". The report makes a number of recommendations aimed at improving the FDA including consumer representation in the FDA decision-making process, "scientific independence" from industry, and compulsory enforcement actions rather than "the discretionary authority of the politically appointed Secretary of Health, Education and Welfare".

6038. Gibbons, M., "The CERN 300 GeV Accelerator: A Case Study in the Application of the Weinberg Criteria", *Minerva,* v. VIII, no. 2, 1970, pp. 180-191. Certain criteria formulated by Alvin Weinberg for allocating resources to R&D are examined in terms of their employment by the U.K. in considering its participation in the CERN 300-GeV accelerator program. Using the reports from the Council for Scientific Policy and the Science Research Council, the author shows that the recommendation for participation in the program "was arrived at by a mode of analysis very close to that put forward by Dr. Weinberg". Leading to the recommendation was consideration of Weinberg's internal and external criteria: Is the field ripe for exploration? Is the necessary manpower available? What is the technological merit of the program? What are its scientific and social merits? Although Weinberg's "analysis provides an extremely valuable first approximation for decision-making in science policy", the author concludes that there "are great if not insuperable obstacles to the

development of a scale for weighting the various values according to a common measure".

6039. Gibbons, N., et al., "Value of Curosity-Oriented Research", *Nature,* v. 225, no. 5237, 14 March 1970, pp. 1005-1006. This article reports a study of the feasibility of quantifying the economic benefits of curosity-oriented research, based on the approach recently proposed by Byatt and Cohen. "[The approach] consists essentially of identifying key discoveries which have had profitable applications and then estimating the economic effects of national marginal delays in the timing of these discoveries; that is, of attempting to assess how much less wealth, suitably discounted to a common year, would have arisen if, because of a smaller scale of effort in particular areas of research, certain discoveries had been made later than they actually were." The principal areas selected for the feasibility study were the Chorleywool bread process, the float glass process, and cryogenics; some other areas of innovation were also considered more briefly. Although the authors conclude that "only rarely is it possible to pinpoint specific curosity-oriented discoveries from which wealth producing applications are derived", curosity-oriented research is not useless and "further work should be directed to exploring various other avenues through which curosity-oriented research may lead to economic benefits".

6040. *Annual Report on Government Patent Policy,* Federal Council for Science and Technology, December 1968, 83 pp. This fourth annual report on government patent policy for federal agencies analyzes the effectiveness of the policy (which was established in 1963) and offers some recommended modifications. The Federal Council for Science and Technology concluded from its analysis that the policy has brought about greater consistency in federal agency practices, has provided a basis for study and resolution of policy issues and practices, and has created increased attention to the need for rapid development and civilian use of government-funded inventions. Overall, it was concluded that the basic principles and criteria of the 1963 policy were sound. However, some changes were suggested in the direction of giving agency heads greater freedom in deciding patent rights, providing the government with greater authority in requiring contractors "to license others when the public interest so requires", and enabling the government to grant exclusive license to any invention which it owns. (This report is available from the Government Printing Office, Washington, D.C. 20402. Price: 45 cents.)

7000 SCIENCE, FOREIGN AFFAIRS, AND NATIONAL DEFENSE

7006. *Science, Technology, and American Diplomacy: Toward a New Diplomacy in a Scientific Age,* **prepared by the Science Policy Research and Foreign Affairs Divisions, Legislative Reference Service, Library of Congress, April 1970, 28 pp.** "The subject of this study is the interaction of U.S. foreign policy and diplomacy with modern science and technology." The report (prepared for the Subcommittee on National Security Policy and Scientific Developments of the Committee on Foreign Affairs, U.S. House of Representatives) provides the background and context for a series of planned studies of specific cases and issues in this field. The cases to be studied include the international control of atomic energy, the Mekong regional development proposal, the Treaty on Outer Space, the U.N. and the seabed, and the NATO science program; issues selected for study include the evolution of international technology, the "brain drain", food and population, world medicine, and computers and proliferating information. The studies will focus on "issues and outcomes that . . . involve institutional mechanisms or policy considerations . . . amenable to congressional review and perhaps action". Their purpose is "to derive insights . . . on how to devise policies and mechanisms to improve U.S. resources for the management" of the interactions of diplomacy with science and technology. (This report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402.)

7007. *Science, Technology, and American Diplomacy: A Selected, Annotated Bibliography of Articles, Books, Documents, Periodicals, and Reference Guides,* **prepared by the Science Policy Research and Foreign Affairs Divisions, Legislative Reference Service, Library of Congress, March 1970, 69 pp.** "This annotated bibliography is the first document to be issued in a continuing, in-depth study of science, technology, and American diplomacy. The project is being conducted by the Science Policy Research and Foreign Affairs Divisions of the Legislative Reference Service, Library of Congress, under the auspices of the House Foreign Affairs Subcommittee on National Security Policy and Scientific Developments." The bibliography is drawn primarily from the period 1965 through 1969. Items are arranged in four categories: (1) articles, (2) books and documents, (3) basic periodicals, and (4) bibliographic tools. The bibliography will be updated and reissued at the conclusion of the study, which will continue over the next 2 years. (This report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402.)

7008. *Symposium on Science and Foreign Policy: The Green Revolution,* **Subcommittee on National Security Policy and Scientific**

Developments of the Committee on Foreign Affairs, U.S. House of Representatives, Ninety-First Congress, First Session, U.S. Government Printing Office, 5 December 1969, 238 pp. This symposium on the "Green Revolution" (i.e., the introduction of recently developed high-yield cereal varieties in underdeveloped nations) was held to acquaint Congress with the phenomenon, to provide a forum for the topic, to draw conclusions for maximizing and extending its benefits, and to produce a publication on the subject. "The dominant theme which emerged from the symposium was that, although much has been done through genetic engineering of seeds to increase agricultural production, the task of feeding the world's hungry millions" has only just begun. The proceedings contain presentations of several specialists and is organized around the topics "The Green Revolution as an Historical Phenomenon: What Has Happened, How and Why"; "The Political, Social, Cultural, and Economic Impact of the Green Revolution"; and "Planning for the Future of the Green Revolution". (This report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402.)

7009. "Soviet Science and Technology: Some Implications for U.S. Policy", *Congressional Record*, v. 116, no. 59, 14 April 1970, H3056-H3062. This report, prepared by F. D. Kohler and M. L. Harvey and reprinted from *Orbis*, is a comparative study of the scientific and technological efforts of the U.S. and the U.S.S.R., with special emphasis on the accelerating Soviet effort and the declining American effort. The topics discussed include the 'roller-coasterism' of U.S. evaluations of Soviet science and technology, the current "down-grading" phase of U.S. evaluations, Soviet strengths in and long-term commitments to science and technology, problems in Soviet science and technology and efforts to solve them, and the sharp decline in federal support of U.S. science and technology. The report notes that the "sharp decline in U.S. inputs into science and technology" is occurring "at the precise time that the USSR [is] increasing and accelerating its own". It concludes that "a truly objective analysis of the Soviet effort" is needed and that the U.S. "must objectively establish . . . national capabilities, purposes and needs" in these areas. "The immediate question . . . is whether we can today fashion a rational program in science and technology for ourselves for the future."

7010. Hamilton, A., "Defense: Laird Warns of 'Soviet Technological Threat' ", *Science*, v. 167, no. 3923, 6 March 1970, p. 1360. Facing strong Congressional "irritation concerning the rising costs of defense modernization", Defense Secretary Melvin Laird argues that "failure to pursue a vigorous modernization program will place the United States on the unfavorable side of a military 'technology gap'. The reason for concern, said Laird, is the increasing momentum of the

'Soviet technological threat'. He said Soviet spending for military [R&D] and space activities is probably greater than U.S. spending, and has been 'increasing at a rate of about 10-13 percent a year' while the U.S. level of effort has declined. Thus the Pentagon's proposed $7.3-billion R&D budget is 'the minimum with which we can have some confidence of meeting our needs in the future' and maintaining American 'technological leadership' in weaponry, he said."

7011. "Laird Looks for New Weapons", *Industrial Research*, v. 12, no. 4, April 1970, p. 41. "The Pentagon plans to stress the development of new weapons systems . . . this year", partly because of the Soviet Union's growing R&D efforts and partly to maintain "a positive position" at the strategic arms limitation talks. According to Defense Secretary Laird, the "most formidable technological threat confronting the U.S. is the Soviet Union's already large and growing military-related R&D effort. Measured in terms of money expended, the Soviet Union is devoting more effort and money to military-related R&D than is the U.S.". R&D funds requested by DOD for FY'71 total $7.346 billion, which is $23 million less than the amount appropriated for '70. The major new weapon systems included in the '71 budget request are cited.

7012. Hamilton, A., "Laird Seeks Industry Aid to Defeat Mansfield Amendment", *Science*, v. 167, no. 3925, 20 March 1970, p. 1599. Concern about the effect of the Mansfield amendment "on academic institutions and other agencies of government has reached a high pitch"; in addition, Defense Secretary Melvin Laird has "announced that he actively opposes congressional attempts to impose restraints on research and development paid for by the Pentagon". In a speech to the Electronic Industries Association (EIA), he "sought support from defense industries for an effort to repeal Section 203" (the Mansfield amendment). "Only about $8 million to $10 million worth of current basic research (out of a budget of $368.5 million) fails to meet the new criterion of military relevance . . . officials privately guess that another $5 million to $10 million of applied research may also fail to pass the new test." However, in his speech Laird "chose to stress the maximum potential effect of the new law". Another legislative proposal opposed by Laird is the bill, sponsored by Senator William Proxmire, that "would place tight restrictions on Pentagon payments to defense contractors for 'independent research and development' (IR&D)". The bill would impose a rule holding that "the independent R&D costs may be covered by the government only if they are for work directly or indirectly of benefit to the purpose of the contract".

7013. "More Grumbling about Mansfield", *Nature*, v. 225, no. 5239, 28 March 1970, p. 1185. The impact and implications of the Mansfield

amendment to the defense appropriations bill, restricting the research policy of the Department of Defense, are discussed. "The fear that the National Science Foundation will not have the funds to take care of the projects dropped by the military departments . . . has been a constant theme in the hearings this year." "There is also the fear that the Department of Defense may be unable to defend all of its present budget for university research against Congressmen who are moved by the spirit of the Mansfield amendment in the defence authorization hearings now under way." The effects of impending budget cuts on university research and education and on research laboratories such as the National Magnet Laboratory and the Haystack radioastronomy facility, are described.

7014. "Defense R&D Decentralizes Among Armed Services", ***Product Engineering,*** **v. 41, no. 4, 16 February 1970, p. 6.** "Engineering companies from now on will find more new projects controlled by the Army, Navy, and Air Force instead of at the Defense Dept. level. Dr. John S. Foster, Jr., chief of defense R&D, has started a reorganization, oriented to mission rather than function, that will reduce both his staff and his control over development work." "Under the new setup, a design proposal favorably received by one of the armed services will run less risk of being disapproved at the higher Defense Dept. level. However, the placing of more responsibility on the services' project managers and procurement officers may make them more critical of industry's performance, less of an ally in keeping a project going. Even with a 10% shrinkage in personnel the Defense Dept. R&D office will remain a good source of information on the engineering gaps in overall national defense that are likely to get attention from the services."

7015. ***Allowances for Independent Research and Development Costs in Negotiated Contracts – Issues and Alternatives,*** **Comptroller General of the United States, 16 February 1970, 117 pp.** This report, prepared by the General Accounting Office (GAO) for Congress, is a study of the participation by major government agencies (DOD, NASA, AEC) in contractors' independent R&D (IR&D) programs, with particular emphasis on the government's management and review policies, procedures, and practices. Based on the study findings, the GAO proposed several changes including the establishment of a government-wide policy for IR&D, improved dissemination of information on contractors' IR&D programs, and uniform procedures for DOD administration of IR&D costs. In addition, the GAO identified certain issues that should be considered in formulating a government-wide policy. The identified issues center around (1) the present treatment of IR&D as an overhead cost (a suggested alternative is the use of direct R&D contracts, or a cost-sharing arrangement for IR&D projects that agencies wish to support), (2) possible restriction of

IR&D to projects related to the agency's mission, and (3) extension of IR&D allowances to companies not holding government contracts as a means of strengthening industrial technology. (For sale by the General Accounting Office, Washington, D.C. 20548. Price: $1.00.)

7016. "I.R. & D – A Billion Dollar Boondoggle", *Congressional Record*, v. 116, no. 30, 2 March 1970, pp. S 2748-S 2750. Senator William Proxmire testified before the Armed Services Ad Hoc Subcommittee on Research and Development that the support by the Department of Defense and NASA of Independent Research and Development (IR&D) is a "backdoor boondoggle now amounting to just short of a billion dollars a year" and that IR&D must be brought under control in order "to bring some measure of accountability into the system" and "to return to Congress its Constitutional prerogatives and to end the usurpation of its powers by the Pentagon and its industrial allies". Using examples of IR&D and citing the arguments presented by the Defense Science Board Task Group and others for the continuation of IR&D as "absurd" and "illegal", he said, "necessary and direct [R&D] now given under IR&D should be converted to R&D contracts. Companies should be paid for 'allocable' expenses directly connected with their Defense contract. They should be paid for [R&D] on weapons systems which Congress specifically authorizes and funds . . . we should no longer continue to spend hundred of millions of taxpayers' money for overhead costs unconnected with direct military or Pentagon needs".

7017. Klass, P. J., "Independent Research Due Closer Scrutiny", *Aviation Week & Space Technology*, v. 92, no. 11, 16 March 1970, pp. 21-22. "Increased government surveillance of contractor independent research and development is certain to result from current hearings, and the issue is likely to be a subject of continuing congressional scrutiny and controversy." Under congressional consideration is a proposal to set a ceiling, perhaps starting with the fiscal 1971 budget of the Defense Department and the National Aeronautics and Space Administration, to be stated as a percentage of their total authorized procurement. Details of the hearings conducted by the House Armed Services investigating subcommittee and the Senate Armed Forces ad hoc subcommittee on R&D are presented, including Pentagon plans in response to congressional criticism. One reason for congressional concern is the fast-rising cost of IR&D which is charged against cost-reimbursable defense and NASA contracts. In 1968 the Pentagon reimbursement of 94 major contractors was $685 million, a 50 percent increase over the 1963 figure. The Pentagon is proposing various actions, such as increased self-surveillance and control over IR&D expenditures, in order to forestall congressional legislation.

7018. Eisendrath, C. R., "To Internationalize Outer Space Research", *Technology Review,* v. 72, no. 3, January 1970, pp. 36-39. A proposal for the internationalization of "instrumental" (nonmanned) space flights is presented along with scientific and political arrangements whereby it might be effected. It is recommended that the U.S. "take the initiative in proposing a permanent I.G.Y.-type arrangement for the future exploration of outer space. The appropriate organ for the scientific community would be the International Committee for Space Research (COSPAR), an executive body organized in 1958 by the International Council of Scientific Unions . . . COSPAR would coordinate the plans of the scientific community into a single program of international research and assign tasks on the basis of capability and interest". The United Nations Committee on the Peaceful Uses of Outer Space could handle the necessary political coordination, and "review for political purposes programs suggested by the international scientific community, as represented by COSPAR". The advantages cited for such a program include "the selection of priorities of international interest and the elimination of redundancies", immediate exchange of information, and increased international cooperation.

7019. "Bleak Record of International Cooperation", *Nature,* v. 225, no. 5238, 21 March 1970, p. 1094. Dr. Thomas Paine, director of NASA, in hearings of the Senate Committee on Aeronautical and Space Sciences, "gave a detailed account of the attempts that have been made to extend the collaboration between the United States and the Soviet Union in space research. In the past six months . . . several invitations by NASA to the Soviet Union have been rebuffed or ignored." "He said that first attempts to cooperate in planning go back to the preparations for the International Geophysical Year in 1955, but even then 'agreements for exchange were held to a minimal or token level'." Collaboration with other countries has been more successful. "According to Dr. Paine, the principles of these agreements are that NASA should enter 'only into concrete, carefully defined projects of clear mutual interest' and that the partners in the collaborative schemes should pay for their own responsibilities." There has been particular interest in collaboration on the space shuttle, but the degree to which other countries will participate has not yet been determined.

7020. Walsh, J., "Civilian Use for Biological Warfare Facility Under Study", *Science,* v. 167, no. 3923, 6 March 1970, p. 1359. Arkansas officials are attempting to win conversion of the Pine Bluff Arsenal, a principal chemical and biological warfare arsenal, to civilian uses. "No order for the closedown of the Biological Complex has been issued. But the White House had indicated that the biological warfare section of the arsenal would be turned over to a civilian government agency

which could make use of the lab facilities, particularly for work on immunization against disease." The possible conversion of the arsenal is being studied by the Departments of Agriculture; Health, Education, and Welfare; and Defense as well as the Office of Science and Technology. "The big obstacle to civilianization at Pine Bluff . . . is the prevailing shortage of federal funds for new programs." However, "[c]onversion of chemical and biological warfare (CBW) workshops to beneficent purposes would have heavy symbolic value. And, while no explicit commitment was made, the White House has already identified itself with efforts to transfer control of work at Detrick [in Maryland] to HEW and to find a new role for Pine Bluff".

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8039. Rabinowitch, E., "On the Sochi Conference", *Bulletin of the Atomic Scientists*, v. XXVI, no. 4, April 1970, pp. 18-20. Highlights of the Nineteenth Pugwash Conference on Science and World Affairs held October 22-27, 1969, at Sochi, USSR, are reviewed. The theme of the conference, attended by 101 scientists from 29 countires, was "World Security, Disarmament and Development". The main concern of the discussions was arms control. "Impending resumption of the strategic arms limitation talks (SALT) between the United States and the USSR justified a hopeful feeling of pertinence for this discussion." In addition, two working groups dealt with, one, current conflicts, particularly the Vietnam war, and two, problems of developing countries. With regard to the possible role that Pugwash could play in the development field, the author suggests the following areas in which the work of other groups could be assisted: "Stimulation of a broader involvement of scientific communities of the world in development problems; East-West cooperation in development, and support of scientists in the developing countries; and . . . interdisciplinary discussion of major development problems involving natural and social sciences." Prospects and problems of Pugwash involvement in developing nations is discussed in the article. The twentieth Pugwash Conference will be held at Lake Geneva, Wisconsin, in September, 1970; in addition a symposium, on "Science and Technology in Development – Priorities for the Seventies", will be held, probably at Stanford, California.

8040. Coblans, H., "Control and Use of Scientific Information", *Nature*, v. 226, no. 5243, 25 April 1970, pp. 319-321. Since 1966 Unesco and the International Council of Scientific Unions (ICSU) have been looking into the feasibility of a world-science information system commonly referred to as UNISIST. This article is a progress report of the effort to date. A draft of the feasibility report that was considered and accepted in December 1969 "convincingly shows that UNISIST is feasible and necessary". Present plans call for the use of "existing networks, chiefly national based on voluntary cooperation and the standardization essential for the exchange of documentation and information". Although some progress is reported toward these objectives, the "inherently difficult" problems of national languages, UNISIST's subject scope, and the organizational form it should take remain to be solved. "The next steps must be to find the financial resources and create the administrative machinery for implementing and maintaining such a world-wide system." To do this, Unesco and ICSU are planning an international conference in 1971.

8041. "Global Atmospheric Studies Planned", *Washington Science Trends*, v. XXVI, no. 3, 27 April 1970, p. 14. "Two major international projects, which may make possible useful weather forecasts two or three weeks in advance, have won the 'unanimous endorsement' of scientist-representatives of 25 nations. The projects were discussed last month at a Brussels meeting in connection with the Global Atmospheric Research Program (GARP). They are designed to test the feasibility of making accurate longer-range forecasts, with the aid of more detailed observational data. The first project, the GARP Tropical Experiment, is expected to involve three months of intensive observations in the Atlantic . . . ." Data gathered from the observations will be used to study energy-exchange processes in the tropical atmosphere. "The second project, planned for 1975 or 1976, will be international in scope and may include four geostationary satellites, two polar orbiting satellites and two balloon subsystems. The balloon will measure temperatures and pressure while the observations are collected by an orbiting satellite." (For further information on either project write the World Meteorological Organization, Avenue Giuseppe Motta, Geneva, Switzerland.)

8042. *Science and Technology in Asian Development*, Conference on the Application of Science and Technology to the Development of Asia, New Delhi, August 1968, Unesco, 1970, 216 pp. The major question addressed by the Conference was "what are the conditions and preconditions for the wider and more intensive application of science and technology needed to raise Asian living standards?" Three aspects of the application of science and technology were considered: basic prerequisites, science education, and science policy. These aspects are discussed and recommendations for their improvement are presented. Additional sections of the report briefly summarize the present status of the application of science and technology in some 20 Asian nations and present the Castasia model for technical manpower and the cost of R&D. The general recommendations of the Conference include a priorities list of areas for action, targets for total national expenditure on R&D, establishment of technology transfer and information centers, and the creation of mechanisms for regional cooperation. (For sale by the Unesco Publications Center, P.O. Box 433, New York, N.Y. 10016. Price: $5.00.)

8043. Zahlan, A. B., "Science in the Arab Middle East", *Minerva*, v. VIII, no. 1, January 1970, pp. 8-35. The present state of science in the Arab Middle East is described in terms of universities and their science faculties. The universities are briefly described, including the obstacles to the attainment of high quality, the recruitment and development of university staff, and research and research training. Some brief case studies are presented as illustrations. The author then discusses decision-making in science in the Middle East and reviews

the quickening research effort in the area. The financing of scientific research and trends in student enrollments are surveyed. Several needed reforms and obstacles to their achievement are cited. These include greater independence of universities from government, more scientific contacts with the "outside world", increase of scholarships for foreign study, and higher university academic standards. The obstacles cited include the shortage of science teachers, shortage of scientists with academic experience, lack of public and government understanding of science, the poor quality of elementary and secondary education, and the brain drain.

8044. Baranson, J., *Industrial Technologies for Developing Economies*, F. A. Praeger, New York, 1969, 168 pp. ($12.50). "This book is essentially a collection of essays relevant to the design and transfer of appropriate technology for industrializing economies." It outlines the concepts and problems relevant to the design and transfer of technology and suggests ways and means to advance technology and improve technological transfer. The first two chapters deal with the economic considerations and cultural constraints that influence product designs and the choice of production techniques. The third chapter analyzes the adjustment problems normally encountered by manufacturing affiliates in economies at intermediate stages of industrial development. Chapter 4 presents some suggestions for national programs to advance technological capabilities and guidelines in bargaining for technology with foreign enterprises. The remaining three chapters are devoted to case material illustrating previously outlined principles and practices. An extensive bibliography is also included.

8045. "International Co-operation in Social Science Research Policy and Organisation", *Science Policy News*, v. 1, no. 5, March 1970, pp. 97-99. This is a report of a Unesco round table discussion on the development and application of the social sciences in developing nations. Topics discussed include the state of the social sciences, strategies for organizing and controlling their usage, and steps to be taken for enhancing their application in developing nations. The role of social sciences is seen as an increasingly important one in the second development decade, especially in connection with national planning for human and material resources. Because of the scarcity of competent social science resources, expansion and concentration of effort is needed. Of first priority is the establishment of social science research and training institutions; additionally needed is a significant increase in the number of social science professionals, mechanisms to facilitate regional communication between social scientists, and social science documentation centers in each region of the world.

8046. Kabir, S., "Science Fails in the Third World", *New Scientist*, v. 46, no. 695, 2 April 1970, pp. 15-16. "As yet, science has made little

impact in the developing countries because it has been tackled in the wrong way. Organized research in large government-sponsored laboratories is often out of tune with real needs, while the barrier between the English of scientific discourse and the local tongues has cut off the bulk of the population from scientific development." Using India as an example, but noting that other developing nations are following the same path, the author discusses how these two factors (research in large government laboratories and the use of a foreign language) have prevented science from having an economic and cultural impact in developing nations. The type of research undertaken in such laboratories is largely irrelevant to the needs of the country, is based on "unimaginative plans", and causes "frustration and mutual suspicion between scientists and society". As for the language problem, the author calls for the use of the local language in order to foster communication between scientists and the rest of the population.

8047. Moor, E. J., "A Technology Gap?" *Lex et Scientia,* **v. 6, no. 4, October-December 1969, pp. 146-155.** The extent of the technology gap between the U.S. and Europe is described and the several bases of the gap are examined. The rapid growth rate of the U.S. economy, its higher family income level, and the European royalty and patent deficit are viewed as manifestations of the technology gap that "is both very real and ever continuing". Among the plethora of factors identified as underlying the gap are the greater supply of capital equipment per U.S. worker, manufacturing economies of scale, greater number of scientists and engineers in the U.S., more R&D, an educational system that fosters application of knowledge, differences in motivation and values, and a decentralized and flexible organization of companies. Overall, the author concludes that the greater U.S. "capacity to apply and commercialize new technology" is the most significant basis of the technology gap.

8048. Huntley, J. R., "Gaps in the Future: The American Challenge and the European Challenge", *Futures,* **v. 2, no. 1, March 1970, pp. 5-14.** The extent and nature of the American challenge to Europe is analyzed, some possible causes and cures for Europe's "backwardness" are suggested, and the European challenge to the U.S. is discussed. The American challenge, as perceived by Europe, centers around U.S. concentration on a few vital industries in Europe, coupled with the penetration of the European markets and the use of Europe's investment capital for further U.S. expansion. In spite of these and other problems, "Europe genuinely wants American enterprise and more of it". But the central question is "Can Europe learn to use and benefit from U.S. investment without becoming subordinate?" The various U.S.-Europe gaps (R&D, education, management, attitude) are briefly examined with the conclusion that they

collectively mean that "Europe's human assets are used inadequately, wastefully". Several measures for closing the gaps are suggested, including education reform, science policy changes, different investment strategies, and above all, leadership development. As for the European challenge, the author suggests that "Americans need European inspiration and the European model to help them give more quality to life".

8049. Lambert, J., "For a Cleaner Europe", *Science News,* v. 97, no. 11, 14 March 1970, p. 280. The growing European concern for environmental quality, and the prospects of doing something about it, are discussed. The Council of Europe has promoted 1970 as Nature Conservation Year to educate European public opinion to the dangers and causes of their deteriorating environment, and information has been collected on the state of the environment from all 14 member countries in Europe. "[But it] is going to be a hard fight in most European countries to enact legislation penalizing polluting industries heavily enough or imposing high energy quality requirements on them; economic growth is still too widely accepted as an over-riding priority." Complicating the Council's efforts is NATO's new Committee on the Challenges of Modern Society that places pollution problems high on its priority list and that is a "powerful competitor for Government interest and support and for the limited funds . . . likely to be made available" for pollution control.

8050. "Technology and the Six", *New Scientist,* v. 46, no. 697, 16 April 1970, pp. 99-100. The common market countries are now making an effort to frame an industrial policy that will stimulate industry, especially advanced technology industries. Heretofore, there has not been a "real common market" for advanced technology goods primarily because of different legal, financial, and other rules under which industry operates in different European countries; consequently, "the companies have tended to stay small and introspective". In an attempt to alter the situation, the Commission of the European Community has proposed a number of new measures: "community development contracts for producing new equipment with a bright commercial future, government purchasing policies . . . concerted over as many fields as possible and as large a volume of orders as possible, [and] a common policy for technological and industrial cooperation" among the Six. Prospects for these proposals are not regarded optimistically because of the "national self-interest" that has pervaded the Common Market's evolution.

8051. "Europeans Moving to Combine Space Launch, Research Units", *Aviation Week & Space Technology,* v. 92, no. 17, 27 April 1970, pp. 88, 93. "European space leaders will take the first major step to merge their international launcher and satellite organizations at a

meeting in Brussels in July. Shortly thereafter, senior space officials will present a redirected European space program that will emphasize applications – regional communications and air traffic control satellites – instead of scientific payloads. Prof. Hermann Bondi, director general of the European Space Research Organization (ESRO), said the merger of his agency with the European Launcher Development Organization (ELDO) could be completed in about two and one-half years." "One aspect of national programs that works against the development of the European space industry, Bondi said, is the tendency for countries to go to the U.S. for components that are not available at home. He would like managers of national programs to shop in Europe for . . . components." "In dovetailing national and European-wide space programs, Bondi sees ESRO as the information coordinator and the center for information exchange." "The air traffic control project will be coordinated with [NASA] because the system will be controlled from both continents to handle the dense North Atlantic air traffic." "In regard to developing a European launch vehicle capability, European leaders believe such a capability is required for independence and for the industrial development in this field."

8052. "A European Stake in the Space Shuttle?", *New Scientist*, v. 46, no. 698, 23 April 1970, p. 180. Prospects for U.S.-Europe cooperation in developing the NASA-proposed space shuttle are briefly discussed. "The project is of direct concern to Europeans because there have been rumors that NASA is looking for financial and technical help from western Europe." "Just how much financial help, if any, Europeans are likely to provide is difficult to forecast, but there certainly seems to be a great deal of interest." The types of technology required for developing the space shuttle is discussed briefly, and the kinds of missions that the shuttle might perform are cited. "Europeans would certainly stand to gain in important areas of technology from cooperating in this project, but it is unlikely that such participation will be forthcoming unless the returns really look like justifying the enormous expense."

8053. "Best Buy for CERN?", *New Scientist*, v. 46, no. 698, 23 April 1970, p. 163. A new proposal has been made to member states of CERN to consider as an alternative to the "stagnating 300-GeV" machine, a 150-GeV accelerator that could be ultimately uprated to 800-GeV. "The ill-starred 300-GeV machine, first conceived back in 1963 . . . has already begun to look obsolescent before the turf has been broken." Acceptance of the new proposal by the British is uncertain although it is reported that "the new design looks very attractive". The cost to the British government would be two-thirds of that of the 300-GeV machine which would call for an initial investment of some £4 million per year for seven years. Other factors

in favor of the new proposal is that it could be built at the present Geneva site and that it would provide Europe with "a useful 150-GeV accelerator comparing not unfavorably with Chicago's 200-GeV giant", and that it "could provide the sure means to keep British, and European, workers in the forefront of high-energy physics".

8054. "EMBO Goes Critical", *Nature,* v. 226, no. 5243, 25 April 1970, p. 301. "Molecular biology in Europe has just taken another step forward with the establishment of the European Conference on Molecular Biology (ECMB)." Twelve countries have already joined the organization, and financial contributions are expected to rise from $632,000 in 1970 to $1 million in 1971. One of the first activities of the ECMB has been to set up a working group to study the proposal to establish a European Laboratory for Molecular Biology. The plan for the laboratory calls for a staff of about 60 scientists, an initial cost of about $5 million, and an annual budget of about $4 million. It is reported that the ECMB working group will agree on the establishment of a laboratory (to become operational in 1973) although there is danger of a dispute over where the laboratory would be located.

8055. "ENEA Takes the Pulse", *Nature,* v. 255, no. 5238, 21 March 1970, p. 1092. The 1969 report of the European Atomic Energy Agency (ENEA) indicates that the application of nuclear power is going through a period of "reappraisal rather than of innovation". "Because the demand for electricity has not risen quite as quickly as expected, there has been a slackening in the ordering of new power stations . . . particularly . . . in Britain and France" which have led Europe in the growth of nuclear power plants. The report, however, points out that "neither lack of confidence in . . . nuclear power nor concern over uranium supplies . . . is implicated" in the slack. Instead, it is attributed to the current economic situation in which "decision-taking in the area of nuclear power is becoming more protacted". But, "these changes in attitudes are not greatly affecting forecasts of the growth of nuclear power in Europe".

8056. "Getting Together on Arctic Research", *Science News,* v. 97, no. 17, 25 April 1970, pp. 405-406. The needs and prospects for U.S.-Canadian research in the Arctic are discussed. Much of the needed Arctic research is dependent on increased international scientific cooperation. Toward this end, scientists from U.S. and Canadian Government agencies are meeting to seek ways in which the two countries could benefit from increased cooperation in Arctic research. The meeting, which is not expected to produce a formal program, is intended to identify research needs and priorities. Although the meeting is "strictly nonpolitical", some Canadians protest that "the

gathering represents an attempt to force the American foot into the door to Canadian resources". Several potential areas of research are cited and discussed.

ARGENTINA

8057. "Notes on Argentine Science", *International Science Notes,* Bureau of International Scientific and Technological Affairs, Department of State, Washington, D.C., no. 24, March 1970, pp. 7-10. Several aspects of Argentine science and science policy are briefly described and discussed, including funding and organization, manpower, industrial technology, and some specific areas of research. Most R&D is carried out by national or professional government institutions, with 85 percent of the total being funded by government. Overall funds for research in 1967 were approximately 0.2 percent of the nation's GNP. As for manpower, there is a surplus of scientists and engineers "principally from a lack of adequate utilization rather than from a lack of need". The state of industrial technology is reviewed briefly and some of the more significant areas are cited. Finally, Argentina's research activities in several scientific fields are noted; the greatest concentration is in the biological and biomedical fields although considerable activity is reported in meteorology, astronomy, and oceanography as well. "Despite some contradictions, Argentina's current government is aware of the necessity for establishing a sound national policy for the development of science and technology."

BULGARIA

8058. "Homage to St. Cyril", *Nature,* v. 226, no. 5243, 25 April 1970, p. 305. The current activities and areas of research of the Bulgarian Academy of Sciences are briefly described. The Academy comprises 10 departments, some 50 research institutes, and several specialized centers; it publishes 63 original journals and serial publications. "In spite of its close links with the academies of the Soviet Union and other Eastern European countries, the ... Academy ... has established several distinctive fields of research." These include research on the structure of new alkaloids, development and application of new alloys, seismology, formulation of new algorithmic languages, chemistry of monomers and high polymers, microminiaturization of electronics and integrated circuits, "and other topics of contemporary interest".

CANADA

8059. Trainor, L., "The Americanization of Canadian Sciences: How We Lose by Default", *Science Forum,* v. 3, no. 2, April 1970, pp. 3-8.

The impact of "American values upon scientific development in Canada" is analyzed and discussed. The lack of an adequate R&D base in Canada is attributed to the foreign (largely American) ownership of Canadian industry, which means that "Canadians exercise almost no control over the direction of the R&D activity which so profoundly affects them". Several specific examples of American influence are cited. Because of the "American technological dynamic" it is "difficult to distinguish what is simply modern and inevitable in scientific development from what is characteristically American". The author contends that long-term interests require the development of a unique Canadian science policy; he points to "certain trends towards distinctive Canadian science organizations" as offering "some measure of hope" that the Americanization of Canadian science can be lessened. To further this, he calls for a study "to discover what are the special problems of our society and how our scientific community can . . . help in solving them".

8060. Kornberg, W., "Batavia Participation Loses Out", *Science News*, v. 97, no. 15, 11 April 1970, p. 380. The Canadian proposal to participate in the development and use of the U.S.'s high-energy accelerator at Batavia, Ill. is described, and the prospects of the proposal receiving support by the Canadian Government is discussed. Canadian physicists proposed a four-year $20 million investment in the facility, plus a $1 million annual contribution to its operating costs, in exchange for ready access to the accelerator. "The door has not yet been completely slammed on the proposal. But Canada is currently deeply involved in . . . establishing a national science policy, with national priorities to be established in terms of national needs, and a $20 million contribution to Batavia is falling lower and lower on the list." At this time, "the capital contribution appears to be out of the question. The contribution to operating funds is still a possibility".

8061. "Co-ordinating Body for Information", *Science Policy News*, v. 1, no. 5, March 1970, p. 101. "The National Research Council is the co-ordinating body for the further development of a national scientific and technical information system (STI). This follows recommendations made by the Science Council of Canada in its Report No. 6. The integrated national system, covering the natural sciences and engineering, will be decentralized and based on the existing resources and systems in industry, the universities, and government."

8062. Poland, F., "Foreign Aid Turns to Research", *Science News*, v. 97, no. 13, 28 March 1970, p. 332. Canada is considering a plan for focusing its aid program to developing nations on science and technology. Noting that "the gap between the low-income and wealthier nations is mainly a science and technology gap", the Canadian

government has proposed the International Development Research Center of Canada. The Center will "identify, initiate and encourage, support and undertake research into the problems involved in the development of economically deprived regions". "It will give high priority to programs that assist the developing countries to build their own scientific and technological capabilities." In addition, the Center may provide a system for storing, retrieving and disseminating data on international development. Several possible areas of special interest for the Center are mentioned: techniques for identifying and evaluating mineral resources, methods of preserving food, more efficient industrial techniques, development of genetically improved plants of high protein value, and population problems.

FRANCE

8063. Fink, D. E., "French Industry Seeks Aerospace Growth", *Aviation Week & Space Technology*, v. 92, no. 12, 23 March 1970, pp. 17-18. "French aerospace industry has asked the government to commit $365 million during the next five-year economic plan for expanded civil aircraft programs, continued strong national and international space efforts, and broader . . . [R&D] studies. The industry also is pressing for an increase in government underwriting of civilian and military development programs that have limited domestic markets but good export potential. To ease the government's long-range financing burden, industry has pledged to accept reimbursable advances rather than investment credits from the national budget." "Main effort of the French industry's future program is toward gaining a larger share of the world commercial aircraft market. A secondary goal is to strengthen France's position in future global space applications programs." "Industry officials are optimistic about the government's desire to continue strong growth in the aerospace field . . . But continuing serious budgetary limitations and pressure on the government to fund domestic and social programs make it doubtful that industry will receive the full support it seeks."

8064. "Developments Watchdog for France", *New Scientist*, v. 46, no. 697, 16 April 1970, p. 118. The French government has established the National Agency of Value and Research (ANVAR) with the functions of assessing the value of inventions, bringing scientists and industrialists together, and assisting private laboratories. The agency's staff keeps tabs on French and foreign developments in electronics, chemistry, biochemistry, computers, metallurgy, the food industry, agriculture, etc., for their possible application to industry. ANVAR provides assistance in obtaining patent rights, in financing development up to the prototype stage, and in certain legal problems. Since its recent initiation, the agency has examined some 700 cases, including over 200 inventions, granted 50 licenses to industry, and signed

60 cooperation contracts with researchers and organizations.

8065. "French Space Unit Seeks $160-Million 1971 Budget", *Aviation Week & Space Technology*, v. 92, no. 17, 27 April 1970, p. 29. "French national space agency (CNES) has requested $160 million for its 1971 budget. The figure . . . is almost double the 1970 budget of $94.6 million. The final 1971 budget figure – scheduled to be approved by the French finance ministry late this year – probably will be considerably below the request." "The 1971 request will be the first segment of five-year budget covered by the sixth economic plan, which includes the years 1971-75. Total funding requested by CNES for this period is $1.08 billion." "Restrictions imposed on the 1969 and 1970 budgets by the government's austerity program, forced CNES to stretch its satellite launch schedule and curtail contributions to the European Launcher Development Organization (ELDO) and the European Space Research Organization (ESRO)." Cost of the Franco-German Symphonie communications satellite is "escalating and could complicate the funding squeeze on other projects".

ITALY

8066. "Crises in Research Funding", *Science Policy News*, v. 1, no. 5, March 1970, p. 102. "In 1969 . . . gross national expenditures on R and D decreased from 0.90 per cent to 0.85 per cent of the GNP." "This is regarded as quite serious as originally the target of a 1 per cent R&D expenditure was set for 1968, was delayed until 1969, and finally fixed for 1970 with the approval of Parliament. Even this target may not be reached. However, what is much more dangerous is that none of the structural reforms recommended for so long . . . have been approved by the government: neither university reform, nor the status of research workers, nor the administration of institutes and laboratories." "This state of stagnation . . . has made it seem as though research problems do not arouse the interest they deserve in a modern state, and inevitably has had serious consequences for research."

8067. Greenberg, D. S., "Science in Italy: Reform Effort Takes a Sharp Turn Leftward", *Science*, v. 167, no. 3926, 27 March 1970, pp. 1704-1706. Problems connected with science in Italy, "which is worse off, by far, than science in any other industrialized nation", are described. These problems, ranging from research workers being " 'manipulated' for the pursuit of goals about which they have no say" to difficulties facing young scientists in beginning their careers, "have pushed the mass of Italian research workers sharply to the left". They now concern themselves with issues such as "the system of developing social priorities in research, the scientist's responsibility

to the public in an economy dominated by profit-making criteria, and the linkage of financial reward to individual position and productivity". "[T]he evolution on policy matters within the Italian scientific community has been accompanied by a growing militancy among researchers, many of whom have come to believe that disruption is the only certain means of arousing the notice of their come-and-go governments." These disruptions, coupled with overcrowded university conditions and the low proportion of national output allotted to research and higher education, have created a situation where the "day-to-day state of science and education in Italy is so chaotic that simply to keep things going is an exhausting enterprise".

KOREA

8068. Boffey, P. M., "Korean Science Institute: A Model for Developing Nations?", *Science,* v. 167, no. 3923, 6 March 1970, pp. 1354-1357. The U.S. is helping to establish "a high-quality scientific institution, known as the Korea Institute for Science and Technology (KIST)". "A big chunk of the American dollar contribution . . . has paid for the services of Battelle Memorial Institute, which has been guiding the development of KIST." "The goals of the $24 million project are ambitious: to bring science and technology into a developing nation quickly; to spur economic development by applying science to local industrial needs; and to reverse the 'brain drain'." The autonomous, nonprofit institute has recruited a staff from among Korean expatriates and has already begun to perform contract research for government and industry. The basis for the initial success of the Institute "seems to be that it gives skilled Koreans an opportunity to use their talents in the service of their country". Beyond this, "there is some feeling that KIST may serve as a prototype for similar institutions in other developing nations".

JAPAN

8069. "Japan's Science and Technology: Trends and Forecasts", *International Science Notes,* Bureau of International Scientific and Technological Affairs, Department of State, Washington, D.C., no. 24, March 1970, pp. 1-5. "Science and technology have played a major role in Japan's phenomenal economic growth." This report presents data and information regarding the role, trends in Japan's R&D, and prospects for the next decade. Industrial R&D "completely overshadows all other categories of Japan's science and technology"; payments for foreign technology and expenditures for industrial R&D both increased more than five-fold during the 1960's. Conversely, the relative importance of university research declined in the 1960's, although funding increased rapidly during the past decade. The Japanese Government "continues to have a relatively small impact on

both the funding and the performance of research"; its role in science policy matters, however, appears to be increasing. As for the 1970's, Japan's R&D will remain "less significant" than that of the U.S. and the U.S.S.R. except for its commercial-oriented research which is expected to reach the U.S. level by 1979. This "competition will be keenly felt".

UNITED KINGDOM

8070. "Green Paper Reviewed", *New Scientist,* v. 45, no. 692, 12 March 1970, pp. 498-502. Four assessments are presented of the government's proposed consolidation of all civil R&D labs into the British Research and Development Corporation (BRDC). The first assessment supports the basic idea of BRDC but criticizes the plan for failing to consider (1) where the Research Associations should fit into the new structure, and (2) inclusion of certain of the defense establishments within BRDC. The second assessment contends that most British manufacturing firms can never be self-sufficient in R&D and that the government should not be prevented from meeting their needs. The third believes that a large increase in R&D outside industry will discourage industry from doing its own R&D and make the absorption of new technologies more difficult. The final assessment urges extensive discussion of the proposal and a reliable estimate of the potential market in industry for sponsored research before going ahead with the plan.

8071. "CIRA Attacks BRDC", *New Scientist,* v. 46, no. 696, 9 April 1970, pp. 51-52. The Conference of Industrial Research Associations in the United Kingdom "dislikes the proposal to set up a new 'BRDC' " (British Research and Development Corporation), combining the laboratories of Mintech and the Atomic Energy Authority. The two assumptions upon which the proposal is based "draw CIRA's fire": "that there is a large enough market for the new agency's services, and that the BRDC will be able to offer an attractive alternative to services provided by existing bodies". According to the CIRA, "the BRDC would have to find most of its work in industry and government. But unless the industrial market shows a dramatic increase, . . . there will be much wasted sales effort chasing a non-existent market". "CIRA sees BRDC as an unnecessary obstruction between industry and the laboratory, hampered by its lack of an industrial background and its poor cost-effectiveness."

8072. "Will BRDC Work?", *Nature,* v. 226, no. 5242, 18 April 1970, pp. 203-204. The proposed British Research and Development Corporation (BRDC) is criticized by the Institution of Professional Civil Servants, which represents many of the staff in the organizations likely to be affected by the proposal. Several points of the proposal

are criticized: lack of specifics in the plan, overestimation of industry's contribution to BRDC, lack of freedom for establishments to develop along their own lines, the splitting of civil and defense research, and certain financial issues. But the essence of the criticism is the timescale which is envisaged for the setting up of BRDC. "By 1975 it is intended that the corporation be able to support itself, earning one-third of its income from industry an;the remainder from government sources." "The IPCS attitude is that a target contribution from industry of 15 to 20 per cent over a much longer period would be more realistic."

8073. Miller, L., "Wanted: A Policy for Science in the Sea", *Science News*, v. 97, no. 10, 7 March 1970, p. 256. "Britain sees herself as a leading maritime nation. In contemporary terms she is lagging badly, partly as a consequence of her lack of any coordinated policy or coherent program, in oceanography." Some of the major elements of this uncoordinated effort are described briefly, and U.K.'s expenditures for oceanography are compared with those of the U.S. It is noted that "there is little or no direction from the Government" in this field, and that the effort is fragmented between government and industry. One proposal for getting more direction and coordination is the establishment of an Institute of Advanced Ocean Studies "which could encompass all the major underwater activities, while ensuring liaison between fringe interests". Whatever the plans, the "keywords . . . must be cooperation, coordination, exploration and education. Exploitation can come later".

8074. Greenberg, D. S., "Research in Britain: A Non-Weeping Formula for Living on Tight Funds", *Science*, v. 167, no. 3925, 20 March 1970, pp. 1596-1598. The rationale behind Britain's solution to the "problem of a shortfall between money and scientific ambitions" is examined. "The British are pointed toward an elitist solution: support the best, concentrate expensive facilities, and let the others get along as well as they can." A policy statement by Sir Brian H. Flowers, chairman of the Science Research Council (SRC), outlines the British plan for maintaining scientific productivity with reduced funds. According to Flowers, "the choice . . . is to spread our resources of money and manpower indiscriminately, and thereby achieve excellence only rarely, if at all, or to concentrate it in the way we are doing". Concentration of resources would be balanced by collaborative use of facilities and "selection of subjects for support would be based on surveys of scientific needs and potentialities that the SRC has been conducting over the past 2 years". According to the author, "from an American perspective, perhaps the most notable aspect of Flowers' address is that it concentrates on getting the most out of the available resources, rather than on lamenting government's inscrutable unwillingness to give science all it seeks".

8075. Amann, R., "The Soviet Research and Development System: The Pressures of Academic Tradition and Rapid Industrialisation", *Minerva,* v. VIII, no. 2, April 1970, pp. 217-241. The impact of Soviet scientific traditions, organizational structures, and planning mechanisms on the achievement of science policy objectives are analyzed and discussed. Forcusing on certain major science policy concerns – resource allocation, information dissemination, and transfer of R&D results into production – the author discusses several variables influencing Soviet science policy and policy objectives. These variables include the economic planning system, organization for R&D, central planning of R&D, impact of the scientific community, and Soviet ideology. Following this is an examination of the obstacles and favorable factors to the development and introduction of new products and processes, and a discussion of recent reforms in the Soviet R&D system. These reforms indicate "some degree of 'convergence'" between the U.S.S.R. and the U.S. in the methods used to guide their national R&D efforts. An appendix presents a model of the Soviet innovation process.

8076. "Soviet Critique", *New Scientist,* v. 46, no. 696, 9 April 1970, pp. 52-53. "The technological gap between the Soviet Union and the United States is becoming wider." "This is one of the points made in a wide-ranging critique of Soviet society, recently circulated in Moscow and addressed to government leaders." "Although the full text of the present critique is not yet available . . . it is possible to gain some idea of its arguments." Briefly, it is believed that although the U.S.S.R. is catching up with the U.S. in "old, traditional industries", it is not doing so in such fields as automation, computers, petrochemicals, and industrial R&D. The "basic cause" advanced for this is "bureaucratic control and lack of intellectual freedom". "The recent economic reforms and the widening scope of scientific research and contacts are attempts to meet the situation. However, the government is clearly not yet prepared to allow complete intellectual freedom." "Whether scientists are going to spearhead any reform movement in the Soviet Union is a moot point."

8077. "Nuclear Energy: U.S.S.R.'s Peaceful Uses", *Chemical & Engineering News,* v. 48, no. 11, 16 March 1970, pp. 13-14. "The U.S.S.R. is conducting an extensive program to develop peaceful uses of nuclear explosives", as revealed in a recent International Atomic Energy Agency Plowshare panel meeting. The Soviet program includes a plan to raise the level of the Caspian Sea (which "is comparable to the Atlantic-to-Pacific transisthmian sealevel canal proposed for nuclear excavation by the U.S."). Moreover, several experiments, already conducted were reported: an experiment to enhance oil

recovery, experiments aimed at stimulating natural gas production, cratering, and experiments in underground salt deposits to create storage cavities. This "extensive program" is being conducted "at a time when the U.S. Plowshare effort is being drastically cut back".

WEST GERMANY

8078. "Education and Science Priorities", *Science Policy News*, v. 1, no. 5, March 1970, pp. 101-102. "Dr. Leussink, Federal Minister for Education and Science, does not foresee any radical changes in his Ministry's policy. Education policy in its widest interpretation was the most important priority." "Among existing research priorities, data processing would occupy a predominant position." Several organizational changes have been made in the Ministry: "a new department for educational planning; a new planning staff . . . for the preparation and co-ordination of all planning; . . . all international questions to be concentrated . . . to bring about unification in the conduct of negotiations; tighter organisation of the space research department to increase delegation of tasks; and establishment of a special section on reactor safety".

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